VOLUME IV - METAL AND NONMETAL MINES

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GENERAL POLICIES AND PROGRAMS

INTERPRETATION, APPLICATION AND GUIDELINES ON ENFORCEMENT OF 30 CFR

IV.G-1 Applicability of 30 CFR 36 to Oil Shale Mines

Permissible equipment for gassy metal and nonmetal mines is approved by MSHA under criteria in 30 CFR Part 36. Certain MSHA mandatory standards in 30 CFR Part 57, Subpart T, require special safeguards for equipment used in gassy mines. Standards 57.22302, .22303, .22304 and .22305 specifically require that only permissible equipment be used in designated portions of such mines. Oil shale mines shall be considered within the scope of Part 36 and shall be guided by appropriate standards relative to Part 36.

IV.G-2 Cameras as Part of Inspection Equipment

Frequently, photographs of the scene of an alleged violation, imminent danger or accident are of great assistance in verifying and correcting the conditions or practices resulting in a violation, danger, or accident. Photographs may also be of great assistance in subsequently resolving differences of opinion between the mine operator and the inspector as to the conditions present at the time of citation. Such photographs may benefit both parties by expediting assessment and review proceedings by providing a pictorial illustration of a violation. Accordingly, when the use of a camera would be necessary or helpful in an inspection, the district manager or subdistrict manager may authorize such use subject to the following special restrictions:

1. All non-gassy metal and nonmetal mines. There are no restrictions on camera use.

2. All gassy metal and nonmetal mines. Tests for methane must be performed prior to any use of a camera. If methane is present at levels in excess of 1%, or if the inspector has reason to believe methane is present, only photographic equipment approved for use in gassy mines by the Approval and Certification Center shall be used.

3. All gilsonite mines. Cameras are prohibited.

The inspectors should make a record of the physical conditions under which the photographs are taken and the date, time and place of each photograph.

A refusal to permit the inspector to carry a camera into the mine will be considered to be a violation of Section 103(a) of the Act and could also be considered an interference or hindrance of the inspector in carrying out the provisions of the Act. If there is a refusal to allow an inspector to take a camera into the mine, an appropriate citation should be issued, and a record should be made of the reason(s) for taking the camera into the mine. The inspection should then be completed.

IV.G-3 Compliance Assistance Visit (CAV)

Under the CAV program for metal and nonmetal mines, MSHA inspectors may make visits to mines in certain situations listed below to point out potential violations without monetary civil penalties being proposed, based on Section 502(b) of the Act which directs the Secretary "...to the greatest extent possible, [to] provide technical assistance to operators in meeting the requirements of this Act and in further improving the health and safety conditions and practices in coal or other mines." A CAV would be conducted only after a request is made by an operator to the appropriate district or subdistrict manager. Such requests should be made at least one to two weeks in advance of the desired date of visit.

The situations where the CAV program is applicable are:

1. New mines not yet producing;

2. Seasonal, closed, or abandoned mines prior to reopening;

3. New facilities or new installations of equipment in an operating mine.

The CAV will cover one or more of the following areas as requested by the operator:

1. Miscellaneous iron installations (guards, walkways, stairways, etc.);

2. Equipment with moving parts (conveyor belts, crushers, screens, etc.);

3. Mobile equipment (trucks, loaders, etc.);

4. Proposed plans and designs;

5. Planned training; and,

6. Other areas as appropriate.

The inspector, while conducting a CAV, will issue notices of violations whenever he observes a potential violation or imminent danger situation. Each notice will be clearly marked "CAV-NONPENALTY" and will not be included in any fashion in the assessment process. Operators should be aware, however, that regular inspections will be made of the operations once they have begun and that during the regular inspections the inspector will look at all of the notices issued during the CAV to ensure that the conditions and practices noted have been corrected. If the correction has not been made, an appropriate citation or withdrawal order will be issued. No additional penalty, monetary or otherwise, will be proposed solely because of the previous CAV.

The inspector, in conducting a CAV, is to proceed directly to the site of the CAV and is not to conduct a regular inspection of the premises. However, should an imminent danger situation be observed, an appropriate order will be issued.

IV.G-4 RESERVED

IV.G-5 Inspection and Sampling Policy for Radiation at Underground Mines

Underground metal and nonmetal mines shall be inspected and sampled for radiation hazards as follows:

1. Where radon daughters exceed 0.1 WL, sample quarterly at full-time producing (FTP) underground mines and whenever a regular inspection is conducted at intermittent (INT) underground mines.

2. Sample for radon daughters annually at all other underground metal mines and at other underground nonmetal and stone mines where radon daughters have occurred in the past.

3. Sample remaining underground nonmetal and stone mines for radon daughters every three years.

4. Monitor underground mines for other forms of radiation as warranted.

IV.G-6 Inspection of Mines on Idle Shifts

Inspection of mines or mills on idle shifts shall be limited to places where conditions are practically the same as they would be on working shifts. For instance, escapeways, travelways, explosive and material storage areas, would not be significantly different and could be inspected on idle shifts. At underground mines, shaft inspections could be conducted on an idle shift.

IV.G-7 Inspection of Small Mines

Small operations often do not have the resources normally available to larger mines, and operators or their agents in small mines are frequently themselves working miners. Time devoted to accompanying inspectors often must be subtracted from productive endeavors and may be a financial burden on the operator. In addition, while the Act entitles the operator to accompany the inspector there is no standard requiring the operator to do so.

However, if an inspection is to proceed unaccompanied by the operator or his agent, the inspector shall discuss with the operator or his agent the details of what the inspector may encounter during the inspection in order to ensure the inspector's safety.

To the extent possible, all issues will be addressed during a single inspection so that the number of follow-up inspections for compliance purposes can be reduced to an absolute minimum. This also includes assignment of electrical inspectors and specialists. As far as resources permit, MSHA shall try to avoid scheduling separate electrical, mechanical, or health inspections at small mines.

The close-out conference may be held at a location and time selected by the operator or the operator's agent so long as they are reasonable. Inspectors should make certain that all citations are explained and that the operator or operator's agent is aware of his/her rights to a safety and health conference with the district manager. Abatement dates on citations should be discussed with the operator.

IV.G-8 Jurisdiction Over Alumina Refining Facilities

See Section 3 Definitions, I.3-3, in Volume I of this Manual.

IV.G-9 Jurisdiction Over Mine Roads

See Section 3 Definitions, I.3-2, in Volume I of this Manual.

IV.G-10 Jurisdiction Over Refractory Mills

See Section 4, Mines Subject to the Act, I.4-2, in Volume I of this Manual.

IV.G-11 MSHA/OSHA Interagency Agreement

See Section 4, Mines Subject to the Act, I.4-1, in Volume I of this Manual.

IV.G-12 Operator Responsibility Over Customer Vehicles

It is the responsibility of the operator of a mine to enforce mandatory safety standards on all vehicles entering the mine property. In the area of backup alarms on customer trucks, the requirement could be met in several ways, including the following:

1. Traffic patterns can be established to eliminate the need to backup.

2. Operator personnel can act as observers where trucks are required to backup.

If the loading of customer trucks is being done in a hard hat area, it is the responsibility of the operator to see that all persons in the area wear hard hats. If hard hats are not available to the customer personnel, the following options will meet the requirement of the standard:

1. Rules can be established that while loading, the customer truck drivers must stay in their truck cabs if the cabs are protected by canopies; or

2. If the customer truck drivers must get out of their cabs, designated safe areas must be provided.

IV.G-13 Portable Operations

See Part 41, III.41-2, in Volume III of this Manual.

IV.G-14 Regular Inspection After Fatal Accident

A regular inspection shall be conducted after the occurrence of a fatal accident, except that such an inspection becomes the judgement decision of the district manager if the mine has received a regular inspection within 60 days prior to the accident. The after-fatal inspection may be counted towards the mandated minimum inspection requirement. However, any mine may receive more than the mandated minimum inspections if dictated by underlying safety and/or health reasons.

IV.G-15 Reporting PCB Spills

Under the authority of the Toxic Substances Control Act, the Environmental Protection Agency (EPA) requires that spills of polychlorinated biphenyl (PCB) be reported whenever the incident poses a substantial risk to human health or to the environment. PCBs have been shown to cause chronic toxic effects in many species even when they exist in very low concentrations. Well documented tests show that PCBs cause, among other things, reproductive failures, gastric disorders, skin lesions, and tumors in laboratory animals.

Workers exposed to PCBs may show a number of symptoms and adverse effects including, but not limited to, chloracne and other epidermal disorders, digestive disturbances, jaundice, impotence, throat and respiratory irritations, and severe headaches.

Spills in mines most commonly result from damage to transformers or capacitors containing PCB dielectric fluid. EPA assumes that a transformer or capacitor contains PCBs if: (1) the nameplate indicates it contains PCB dielectric fluid; or (2) the owner or operator has any reason to believe that it contains PCB dielectric fluid. If a transformer or capacitor does not have a nameplate, and there is no information to indicate the type of dielectric fluid in it, the transformer or capacitor is assumed to contain PCB fluid. PCB dielectric fluids may be listed under the following trade names: Askarel, Aroclor, Pydraul, Therminal, Pyroclor, Santotherm, Pyralene, Pyranol, Inerteen, Asbestol, Chlorextol, Diachlor, Dykanol, Elemex, Hyvol, No-Flamol, Saf-T-Kuhl, Aroclor B, Chorinol, Chlorphen, and Eucarel.

As a general rule, EPA does not require that spills involving a single capacitor be reported unless PCBs threaten to enter a water-course. Minor leaks in transformers, such as bushing leaks or weeping, also do not require reporting. However, such spillage or leaking should be stopped and repaired as soon as possible.

If a spill should occur at a mine, the mine operator's first priority should be to control the spread of the spill by damming or diking the leak. Any threat of contamination to water supplies should be given the highest priority. Appropriate personal protection (e.g., impermeable gloves, boots and aprons, goggles, and respirators) must be worn by persons cleaning up spills pursuant to applicable MSHA regulations.

Once the spill is contained, clean up measures can begin. All materials contaminated with PCBs, including soil and debris, should be collected, stored and disposed of in accordance with EPA regulations.

Upon discovery of a PCB spill, the district manager shall be notified immediately. The district manager is responsible for reporting the spill immediately to the National Response Center operated by the U. S. Coast Guard at 800-424-8802 and the Metal and Nonmetal Division of Health. The Coast Guard will inform the appropriate EPA office. The Coast Guard and/or EPA will take steps to assure that the clean up of the spill is properly handled. Prompt reporting of the incident is necessary to prevent the spread of this toxic chemical into the environment. The district manager should offer to assist EPA or the Coast Guard if needed and should request that they keep him informed of the clean up activities.

EPA regulations and other publications are available in the districts. EPA's regulations on labeling are accepted by MSHA as being in conformance with mandatory standard 30 CFR 56/57.20012.

IV.G-16 Second- and Third-Shift Inspections

The inspector shall make sufficient inspections in multi-shift operations to determine that safe conditions exist and that proper work procedures and practices are applied on all shifts.

IV.G-17 Suspected "Foul Play" Felonies

It is MSHA's policy to cooperate with state and local law enforcement officials in all circumstances where a felony violating state or local law is suspected.

If, in the course of an inspection or investigation, there is reason to believe that foul play has occurred (for example, a death or an injury of suspicious cause or a fire of suspicious origin), the following procedures are to be followed:

1. The inspector or investigator should consult through normal channels with the district manager.

2. The district manager should contact the Administrator's Office and the appropriate Regional Solicitor's Office.

3. After consultation with the Administrator's Office and an attorney in the Regional Solicitor's Office,

promptly report the matter to appropriate state or local law enforcement officials.

4. Cooperate with the state and local officials, but ensure that any evidence which may also be relevant to a possible Mine Act violation is preserved.

5. If state or local law enforcement officials wish to participate in MSHA's investigation, the matter first should be cleared with the Supervisory Special Investigator in the Headquarters Office.

6. If only evidence or other information is being shared with state or local law enforcement officials, advance clearance from Headquarters is not necessary, but the Supervisory Special Investigator should be promptly apprised of any such activities or contacts.

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PARTS 56/57 SAFETY AND HEALTH STANDARDS - SURFACE/UNDERGROUND METAL AND NONMETAL MINES

Subpart B Ground Control

56.3130 Wall, Bank, and Slope Stability

This standard requires that mining methods that will maintain wall, bank, and slope stability shall be used in places where persons work or travel in performing their assigned tasks.

Consistent with this standard, MSHA requires that a bench located immediately above the area where miners work or travel be maintained in a condition adequate to retain material that may slide, ravel, or slough onto the bench from the wall, bank, or slope. However, there may be instances in which the ground conditions at a mine present a particular hazard. In such situations, more than one bench above the area where miners work or travel must be maintained in a condition adequate to retain material that may come onto the bench from the wall, bank, or slope. It is normally expected that one bench will be so maintained, but if more than one bench above the area where miners work or travel is necessary, only the number of benches necessary to provide adequate protection will be required to be maintained.

A bench may be considered adequate even if material has accumulated on the bench. In determining whether a bench with material accumulated on it is adequate, consideration shall be given, but not limited to the following factors: (a) the method of mining; (2) the amount of material on the bench; (3) the amount and rate of material coming onto the bench; (4) the angle of the bank, wall, or slope, particularly if it is close to the angle of repose; (5) the composition of the wall, bank, or slope; and (6) the configuration of the bench.

If the bench immediately above an area where miners work or travel is no longer adequate to catch material, and sending miners and equipment onto the bench to clean it presents a greater hazard than raveling or sloughing, cleaning is not appropriate. Examples of such circumstances may be were there are concerns about the stability of the bench itself, concerns that removal of material from the bench would destabilize the slope immediately above the bench, or concerns that the equipment

could overtravel the edge of the bench. Where the bench cannot be safely cleaned, other measures shall be taken to protect miners. Other measures may include placing a berm at the base of the wall, bank, or slope to prevent the overtravel of material into the area where miners work or travel or ceasing mining in the affected area.

56/57.3200 Correction of Hazardous Conditions

This standard prohibits work or travel, other than corrective work, in areas where hazardous ground conditions exist. Posting of a warning against entry is required until corrective work is completed if workers could enter the area inadvertently. In addition, barriers are required if the area is left unattended prior to the completion of the corrective work. The mode of travel in the area must be evaluated to determine what type of barrier is appropriate to "impede" unauthorized entry. Examples of barriers would be piles of muck, piles of large boulders or a timber barricade. These barriers would have openings to allow access for persons who are correcting the hazardous conditions. These posting and barrier requirements do not apply to underground face areas under development where the corrective work is performed on a continuing basis as a part of the mining cycle, and the only workers exposed are those engaged in the corrective activity.

56/57.3203 Rock Fixtures

This standard contains the requirements for installation and testing of all rock fixtures and accessories used for ground support. In all cases where rock fixtures are selected as the method used to support ground, they must meet the requirements of 56/57.3203.

All bolts tensioned by torquing must be within the torque range set out in paragraph (f)(1). Mine operators are required to test the first, tenth and last bolt installed in each work area during the shift as a check on whether or not the torquing requirements are being achieved. When the testing process reveals that a fixture is not properly torqued, steps must be taken to determine the extent of defective installation and to correct all improperly installed fixtures.

The ground conditions in many active face areas require the installation of only a few bolts during each blasting cycle. Testing of the first and last bolts in each work area will help ensure the integrity of the ground in these instances. Where large numbers of bolts are installed on a continuing basis,

testing of the first, tenth and last bolt in each work area would normally provide the frequency of testing necessary to identify a bolting problem and enable the operator to take corrective action.

The mine operator must certify that all tests required by this standard have been conducted. In the case of testing of the ASTM bolts and accessories by the manufacturer of the devices, the mine operator's certification responsibility is satisfied by obtaining a copy of the manufacturer's certification and making it available to the inspector.

The correction of improperly installed fixtures will also help to ensure compliance with standard 56.3130 which requires that wall, bank and slope stability be maintained at surface mines where miners are exposed, and standard 57.3360, which requires that ground support systems at underground mines be designed, installed and maintained to control the ground where miners are exposed.

56/57.3401 Examination of Ground Conditions

Under this standard the mine operator must designate the persons experienced in ground control who will examine and test the ground. These persons may be supervisors or miners. Mine management retains the responsibility for examination and testing of ground conditions. The standard also specifies when examinations and tests must be made.

The 57.3401 requirement for examination of travelways is not applicable to escape routes from underground mines. The examination and maintenance of underground escape routes are specifically addressed in 57.11051, Escape Routes.

56/57.3430 Activity Between Machinery or Equipment and the Highwall or Bank

This standard is applicable to surface mines and surface areas of underground mines. It addresses the hazards which exist when persons work or travel near a highwall or bank and their escape from a fall or slide of material could be hindered by the machinery and equipment in their escape path.

If escape could be hindered, no work or travel is permitted. If, however, the machinery or equipment poses no hindrance, the standard is not applicable. Consideration must be given to: the height of the wall or bank; the distance between the equipment and wall or bank; the size and positioning of the equipment; the

location of the worker in relation to the escape route; and any surrounding noise levels or distractions which could prevent the detection of falling ground.

Where machinery or equipment becomes disabled near a highwall or bank, the equipment operator can often safely exit on the side away from the hazard. If this is not possible, exit on the wall side is permitted. Remounting on the wall side may also become necessary in order to reposition or move the equipment to a safe location for repairs. When the equipment is not removed for repair, it must be repositioned at the site so that workers will not be exposed to fall of ground hazards from which their escape is hindered.

57.3461 Rock Bursts

This standard requires mine operators to notify MSHA of a rock burst within twenty-four hours of occurrence. It also requires that a rock burst control plan be implemented within ninety days of the occurrence. The plan must be updated as conditions change or controls are altered. When innovations are added to an existing rock burst control program, the changes are considered an "update" in accordance with paragraph (c) of the standard and are to be included in the plan at that time.

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57.4057 Underground Flame-Resistant Trailing Cables

This standard requires that underground trailing cables be flame-resistant in accordance with 30 CFR 18.64. Section 18.64(f) specifies that an acceptance marking be imprinted on the cable for identification purposes.

The attached list, "Manufacturers of Cables with MSHA Acceptance Numbers," can be used to verify accepted cables. An approval number will be accompanied by letter designations which denote the governmental division granting approval -- MSHA, MESA, BM (Bureau of Mines), P (Pennsylvania Bureau of Mines), etc. Cables which are marked with the prefix "P" for Pennsylvania approval shall be considered acceptable if the number is followed by an MSHA, MESA or BM notation.

When a trailing cable is imprinted with a series of numbers or letters which do not appear on the attached list, the Approval and Certification Center (A&CC) at Triadelphia, West Virginia shall be contacted for assistance in determining the acceptability of the cable. This includes newly manufactured cables which may be determined to be acceptable subsequent to the printing of the attached list.

Inquiries regarding the approval of underground trailing cables should be directed to the MSHA Approval and Certification Center, Triadelphia, West Virginia (304) 547-0400.

Manufacturers of Cables with MSHA Acceptance Numbers

COMPANY	MSHA ACCEPTANCE NUMBER
Simplex Wire and Cable Company P.O. Box 397 North Berwick, ME 03906	101-MSHA
Anaconda Wire and Cable Company Marion, IN 46952	102-MSHA
Kaiser Aluminum and Chemical Corporation 500 Wood Street Bristol, RI 02809	103-MSHA
The Okonite Company P.O. Box 340 Ramsey, NJ 07446	104-MSHA
Rome Cable Company 421 Ridge Street Rome, NY 13440	105-MSHA
Collyer Insulated Wire Company, Inc. 100 Higginson Avenue Lincoln, RI 02865	107-MSHA
General Electric Company 1285 Boston Avenue Bridgeport, CT 06602	108-MSHA
General Cable Corporation Cornish Wire Products 800 Rahway Avenue Union, NJ 07083	110-MSHA
Reynolds Metals Company Front and Lloyd Streets Chester, PA 19013	111-MSHA

COMPANY	MSHA ACCEPTANCE NUMBER
Crescent Insulated Wire and Cable Co., Inc Trenton, NJ 08605	112-MSHA
Phelps Dodge Cable and Wire Company P.O. Box 391 Yonkers, NY 10702	114-MSHA
Cerro Wire and Cable Company 5500 Maspeth Avenue Maspeth, NY 11378	115-MSHA
Teledyne Western Wire and Cable Company 2425 East 30 Street Los Angeles, CA 90058	116-MSHA
General Cable Corporation Cornish Wire Products 101 Water Street Williamstown, MA 01267	117-MSHA
Whitney-Blake Company P.O. Box K New Haven, CT 06514	118-MSHA
Continental Copper and Steel Industries, Inc. CCS Hatfield 360 Hurst Street Linden, NJ 07036	120-MSHA
Diamond Wire and Cable Company Sycamore, IL 60178	121-MSHA
ITT Wire and Cable Division 95 Grand Avenue Pawtucket, RI 02862	122-MSHA
Carol Cable Company 249 Roosevelt Avenue Pawtucket, RI 02860	123-MSHA
Plastic Wire and Cable Corporation P.O. Box 486 Jewett City, CT 06351	124-MSHA

COMPANY	MSHA ACCEPTANCE NUMBER
Essex International, Inc. Power Conductor Division 2601 South Adams Street Marion, IN 46952	125-MSHA
Bell Northern Research Wire and Cable Laboratory P.O. Box 6122 Montreal, Canada	126-MSHA
Chester Cable Corporation Chester, NY 10918	127-MSHA
The Rockbestos Company 1910 Cochran Road Pittsburgh, PA 15220	128-MSHA
Narrangansett Wire Company 1125 Main Street Pawtucket, RI 02860	129-MSHA
Suprenant Wire and Cable 172 Sterling Street Clinton, MA 01510	131-MSHA
Packard Electric P.O. Box 431 Warren, OH 44482	132-MSHA
Silec 22, Rue Du General Foy Paris (8e) France	133-MSHA
Hackethal - Draht - und Kable - Werke A.G. Hanover West Germany	134-MSHA
Eastern Electric Wire and Cable Company Interstate Industrial Park Bellmawr, NJ 08030	135-MSHA

COMPANY	MSHA ACCEPTANCE NUMBER
American Insulated Wire Corporation Central Avenue and Freeman Street Pawtucket, RI 02862	136-MSHA
Boston Insulated Wire and Cable Company 55 Bay Street Boston, MA 02125	138-MSHA
Calco Electric Wire and Cable Corp. 1864 E. Marlton Pike Cherry Hill, NJ 08034	145-MSHA
Industrija Kablova Svetozarevo, Yugoslavia	152-MSHA
Manhattan Electric Cable Company Station Plaza Rye, NY 10580	155-MSHA
ExCel Wire and Cable Company 108 Elm Avenue P.O. Box D Tiffin, OH 44883	159-MSHA
Corona Insulated Wire Company, Inc. 101 Central Avenue Farmingdale, NY 11735	162-MSHA
Felten and Guilleaume Post Fach 805001 5000 Koln 80	164-MSHA
Electrical Conductors, Inc. 2500 Commonwealth Avenue North Chicago, IL 60064	166-MSHA
Southwire Company Carrollton, GA 30117	168-MSHA

COMPANY	MSHA ACCEPTANCE NUMBER
BICC General Cables Limited Leigh Works, Leigh Lancashire WN7 4HB England	177-MSHA
The Rochester Corporation Electrical Products Division Culpepper, VA 22701	178-MSHA
Trexon Products Company P.O. Box 3880 Oak Park, MI 48237	179-MSHA
Communication and Control Engineering Company, Ltd. 66 Dalaire Crescent Richmond, Ontario, Canada KOA 2Z0	181-MSHA
Belden Corporation 2000 South Bataira Avenue Geneva, IL 60134	182-MSHA
Canada Wire 147 Laird Drive Toronto, Ontario M4G 3W1	183-MSHA
Amercable El Dorado Industrial Park 1200 Bailey Road P.O. Box 1552 El Dorado, AR 71730	184-MSHA
The Kerite Company 49 Day Street Seymour, CT 06483	186-MSHA
Sumitomo Electric Industries, Ltd. 606 South Olive Street Los Angeles, CA 90014	187-MSHA
Phillips Cables, Ltd. King Street West Brockville, Ontario Canada KGV 5W4	188-MSHA

COMPANY	MSHA ACCEPTANCE NUMBER
Eickoff-Siemans 480 Manor Oak Two Cochran Road Pittsburgh, PA 15220	189-MSHA
Brand-Rex Company Willimantic, CT 06226	191-MSHA
USBM Pittsburgh Research Center Cochrans Mill Road P.O. Box 18070 Pittsburgh, PA 15236	192-MSHA
Pirelli Cable Corporation 800 Rahway Avenue Union, NJ 07083	194-MSHA
Flygt Corporation 129 Glover Avenue P.O. Box 857 Norwalk, CT 06856	198-MSHA
Hawker Siddeley Diesels and Electrics, Inc. 2690 Cumberland Parkway Suite 412 Atlanta, GA 30339	199-MSHA
Laribee Wire, Inc. 101 Central Avenue Farmingdale, NY 11735	204-MSHA
Prestolite Wire 3529 24th Street Port Huron, MI 48060	205-MSHA
Pacific Electricord Company 747 West Redondo Beach Blvd. P.O. Box 10 Gardena, CA 90247	211-MSHA

COMPANY	MSHA ACCEPTANCE NUMBER
Pirelli Cables, Inc. 65 Richelieu St-Jean-Sur-Richelieu Quebec J3B 6X2 Canada	212-MSHA
Conspec 901 Furman Boulevard Buffalo, NY 14203	215-MSHA
Industria Venezolana de Cables Electricos, C.A. (Cabel) Apartado Chacao 62049 Caracus, Venezuela	216-MSHA
Walsin Lihwa Electric Wire and Cable Corp. The Walsin Building 219 Chung Hsiao East Road, Section 4 Taipei, Taiwan Republic of China	217-MSHA
Nacional de Conductores Electricos, S.A. de C.V. Poniente 140 No. 720 Industrial Vallejo Del. Atzcapotzalco 02300 Mexico, D.F. APDO. Postal 78-057	218-MSHA
Pacific Electric Wire and Cable Company,Ltd. Fourth & Fifth Floor, Pacific Commerical Bldg. 285 Chung, Hsiao East Road, Section 4 Taipei, Taiwan Republic of China	219-MSHA
Lynenwerk GmbH and Company POB 1240 D-5180 Eschweiler, West Germany (Eickhoff Corporation - USA Representative)	224-MSHA
M/A-COM COMM/Scope, Incorporated P.O. Box 199 Catawba, NC 28609	225-MSHA

COMPANY	MSHA ACCEPTANCE NUMBER
Pirelli, S.A. Companhia Industrial Brasileira Av. Alexandre de Gusmao, 487 Santo Andre S.P. CEP 09000 Caixa Postal 22 (Pirelli Cable Co. of NJ - USA Representative)	227-MSHA
Conductores Monterrey, S.A. APDO, 2039 Monterrey, N.L. 64000 Mexico JMC 1608 (Davies Associates International, Ltd., - USA Representative)	228-MSHA
Alpha Wire Corporation 711 Lidgerwood Avenue Elizabeth, NJ 07207	229-MSHA
Seoul Electric Wire Company, Limited 467 Jangjiri, Kwangju-Up, Kwangju-Kun, Kunggi-Do The Republic of Korea	230-MSHA
Essex Group, Incorporated East Union Street and Sagamore Parkway P.O. Box 7000 Lafayette, IN 47903	231-MSHA
Huber and Drutt of Austria c/o Kloeckner-Becorit North America, Inc. 225 Berry Road, P.O. Box 1286 Washington, PA 15301	233-MSHA

57.4460(b) Underground Storage of Vehicles Containing Gasoline

Gasoline-powered vehicles may be operated in underground mines under limited circumstances as defined in 30 CFR 57.4461. These vehicles and the gasoline in their tanks are considered to be "in use." The underground "storage" of gasoline is prohibited in any quantity by 30 CFR 57.4460(b).

The storage of any vehicle in an active underground mine having gasoline in its tank shall be considered a violation of 30 CFR 57.4460(b) and an appropriate citation shall be issued.

When a gasoline-powered vehicle is being operated underground as mining equipment in compliance with 30 CFR 57.4461, the vehicle and the gasoline in its tank are considered to be "in use" and are not in violation of part 57.4460(b).

56/57.4503 Conveyor Belt Slippage and Detection System

This standard requires that belt conveyors shall be equipped with a detection system capable of automatically stopping the drive pulley in the event of excessive slippage of the belt, where ignition of the belt could create a hazard to personnel. The detection systems required by this standard are available on an over-the-counter basis from several manufacturers.

For surface operations, areas that could create a hazard to personnel in the event of a fire include the following:

1. Surge tunnels.

2. Conveyor belts located in areas where other combustible or flammable materials are stored within 25 feet of the belt. This is to prevent a conveyor belt fire from spreading and becoming a large and more serious fire. The policy is consistent with distances used as safeguards in the electrical and explosives standards.

3. Any restricted area where a conveyor belt fire could hinder the escape of personnel who normally work in that area.

56/57.4530 Exits From Buildings or Structures

This standard requires that surface buildings or structures in which persons work shall have a sufficient number of exits to permit prompt escape in case of fire. The standard applies to buildings or structures where persons normally work.

Excluded from the requirements of this standard are those areas where persons work infrequently, e.g., change rooms, surge tunnels, toilet facilities, and cafeterias. "Exits" may be doorways, passageways, windows, or other openings that lead out of the building or structure. While the standard uses the word "exits", a single exit may be acceptable where it permits the prompt escape of persons in case of fire.

When considering what constitutes sufficient exits, the following factors should be considered: (1) the size of the exit(s); (2) the height of the exit(s) from the ground; (3) the size of the building; (4) the number of persons who normally work in the area serviced by the exit(s); (5) the nature of the operations; (6) the presence of potential fire hazards; (7) the type of materials with which the building is constructed, e.g., wood, brick, block,

stone, metal, concrete; and (8) the presence of fire suppression devices or the availability of fire extinguishers.

56/57.4531 Surface Buildings or Rooms for Flammable or Combustible Liquid Storage

57.4533 Surface Buildings or Structures in Vicinity of Mine Openings

Standard 56/57.4531 requires that certain ventilation and construction measures be included in buildings and rooms where flammable or combustible liquids are stored on the surface, if the storage is located within 100 feet of a work station. Standard 57.4533 requires that surface buildings and similar structures located within 100 feet of certain mine openings be constructed with specified fire protection characteristics.

Several compliance alternatives are permitted for achieving appropriate fire protection in both standards. If a mine operator chooses alternative (b)(1) of 30 CFR 56/57.4531 or alternative (b) of 57.4533, difficulty may be encountered in determining what types of construction meet a fire-resistance rating of at least one hour. MSHA enforcement personnel may also need assistance in recognizing one hour fire resistant construction due to the numerous combinations of techniques and materials which may be used.

Clarification in this regard is contained in the section on "Fire Safety in Building Design and Construction," pages 6-60 through 6-79 of the Fire Protection Handbook, 14th Edition, Section 6, Chapter 7 entitled Structural Integrity During Fire, published by the National Fire Protection Association (NFPA). This reference material provides fire resistance ratings for certain types of material and its related thickness for such structural components as beams, joists, trusses or girders, load-bearing walls, stud walls and partitions, various finishes over wood framing, and floor and roof construction. Additional information regarding fire resistant building materials and assemblies may be retrieved from Underwriters Laboratories Inc., The Factory Mutual System, The National Bureau of Standards, trade association publications, and various building codes.

57.4560 Fire-Retardant Timber in Mine Entrances

Standard 57.4560 provides mine operators with three alternative methods of compliance to deter the propagation of fire in certain mine openings when support timber is in place. One of those alternatives is the coating of timber with a fire-retardant which provides a flame spread rating of 25 or less.

Flame spread ratings may be established by a testing agency or by MSHA at the request of the manufacturer. Flame spread ratings may be indicated by a document from the testing agency, a written statement from the manufacturer or by product labels which specify the rating according to test results.

The attached list, "Mine Sealants Accepted From 1977 to 1985" (including mortar replacements), has been accepted by MSHA's Approval and Certification Center for compliance with this requirement. This list is updated by the Center regularly, and the Engineering and Testing Division, Materials and Explosions Testing Branch should be contacted on (304) 547-0400, when appropriate, to obtain the current list. Other products are also acceptable if evidence of a flame spread rating of 25 or less can be shown through test results.

MINE SEALANTS ACCEPTED FROM 1977 TO 1985

COMPANY	ACCEPTANCE NUMBER
American Energy Group 725 Brea Canyon Road Suite 4 Walnut, CA 91789 (714) 594-0015	IC-44
American Energy Products Corp. Raritan Center, Building 435 Edison, NJ 08837 (201) 225-0228	IC-58
Austin Industrial Coating Corp. 300 Mt. Lebanon Boulevard Pittsburgh, PA 15234 (412) 563-3300	IC-72 thru IC-72/3
B-Bond Industries, Inc. Washington & Ludwick Streets Greensburg, PA 15601 (412) 836-2160	IC-36 thru IC-36/3
W. R. Bonsal Company P.O. Box 127 Conley, GA 30027 (404) 361-0900	IC-30
Burrell Construction & Supply Co. One Fifth Street New Kensington, PA 15068 (412) 339-1011	IC-18 thru IC-18/3
Celtite Incorporated 150 Carley Court Georgetown, KY 40324 (502) 863-6800	IC-29

COMPANY	ACCEPTANCE NUMBER
CISCO Coal Industry Service Company P.O. Box 134 Pounding Mill, VA 24637 (703) 964-6755	IC-66 thru IC-66/9
Conproco Corporation P.O. Box 368 Hooksett, NH 03106 (603) 668-8810	IC-107
Energy Ventures Analysis, Inc. 1111 North 19th Street Arlington, VA 22209 (703) 276-8900	IC-120
Faswall, Incorporated P.O. Box 1705 Oak Hill, WV 25901	IC-96
Genstar Stone Products Company Executive Plaza IV Hunt Valley, MD 21031 (301) 628-4000	IC-93 thru IC-93/1
Harris Mining Company P.O. Box 628 Spruce Pine, NC 28777 (704) 765-4251	IC-13
INCA Company Stanton & Empire Streets Wilkes-Barre, PA 18702 (717) 822-2191	IC-1 thru IC-1/8
James River Limestone Company, Inc. Drawer 617 Buchanan, VA 24066 (703) 254-1241	IC-61
M&P Distributors, Inc. P.O. Box 187 Lesage, WV (304) 736-4046	IC-115 thru IC-115/3

COMPANY	ACCEPTANCE NUMBER
Michael-Walters Industries, Inc. 1000 Lincoln Income Center Suite 103 P.O. Box 34066 Louisville, KY 40232 (502) 456-2100	IC-121
Nalco Chemical Company 2901 Butterfield Road Oak Brook, IL 60540 (312) 887-7500	IC-102 thru IC-102/1
Ostler Rocky Mountain Refractories 2436 West Andrew Street Salt Lake City, UT 84104 (801) 972-2776	IC-48
Package Cement Products, Inc. P.O. Box 157 Highway 141 North Sullivan, KY 42460 (502) 333-5745	IC-122 thru IC-122/5
Q-Bond Corporation of America 4770 Fox Street, No. 14 Denver, CO 80216 (303) 534-2171	IC-17
Qwikrete Companies 2250 Stephenson Road Lithonia, GA 30058 (404) 482-7264	IC-9
Stone Mountain Manufacturing Co. Lafayette Executive Center Suite 34 P.O. Box 7320 5750 Chesapeake Boulevard Norfolk, VA 23509 (804) 853-7451	IC-39

COMPANY	ACCEPTANCE NUMBER
Strataseal, Incorporated 163 Orchard Drive McMurray, PA 15317 (412) 941-6444	IC-49 thru IC-49/7
Strong-Lite Products Company P.O. Box 8029 Pine Bluff, AR 71611 (501) 536-3453	IC-87 thru IC-87/2
Thermocoat Incorporated 5910 Wellesley Pittsburgh, PA 15206 (412) 661-4281	IC-35
Therm-O-Rock Incorporated Division of Allied Block Chemical Co. P.O. Box 455 New Eagle, PA 15067 (412) 381-4647	IC-16 thru IC-16/1
United States Mineral Products Co. Furnace Street Stanhope, NJ 07874 (201) 347-1200	IC-62
Wen-Don Corp. P.O. Box 13905 Roanoke, VA 24038 (703) 982-0561	IC-116
Wolf-Pruf, Inc. P.O. Box 9779 Atlanta, GA 30319 (404) 252-0757	IC-76
Woodruff Supply Co., Inc. P.O. Box 426 Madisonville, KY 42431 (502) 821-3247	IC-99 thru IC-99/9

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56/57.5001(a) Nuisance Particulates

The only nuisance particulates for which a citation can be issued are those that are listed specifically as nuisance particulates in Appendix E of the 1973 TLV Booklet and exceed the 10 mg/m^3 TLV. At mines where the commodity produced is an unlisted nuisance particulate, and there is no silica hazard, continue to sample and analyze airborne dusts for listed toxic substances and take appropriate enforcement action.

56/57.5001(a) Issuing Citations on the Basis of Vacuum Bottle or Bistable Gas Samples

Vacuum bottle or bistable gas samples may be used as the principal determining factor in classifying a mine as gassy (30 CFR 57.22003). However, vacuum bottle and bistable gas samples cannot be used as the basis for the issuance of citations or orders unless arrangements for special sampling bottles are made. The principal use of vacuum bottles and bistables is for rough screening to determine if potential problems exist which require more thorough evaluation.

56/57.5001(a)/.5005 Issuing and Terminating Citations

Except where indicated, inspectors shall treat standards 56/57.5001 and 56/57.5005 as one standard when issuing citations. Issue one 56/57.5001(a)/.5005 citation for each miner whose exposure to airborne contaminant(s) exceeds the contaminant's enforcement level. The Metal and Nonmetal Health Inspection Procedures Handbook provides instructions on calculating the contaminant's enforcement level.

The body of the citation must contain all pertinent information, such as: the contaminant's permissible exposure limit (PEL) and error factor; the shift or time-weighted average (SWA/TWA); the date of the overexposure; the date of the citation; the miner's location and job description; whether an adequate respirator was provided and worn and a respiratory protection program was in place consistent with 56/57.5005; and the reason for the overexposure, such as obvious deficiencies or breakdowns in the operator's control system. The citation's initial abatement date should reflect the time needed to provide an appropriate respirator and develop a respiratory protection program consistent with 56/57.5005. Give less time if you can identify more expedient controls that will bring the miner's exposure into compliance. For highly toxic or dangerous contaminants, keep the abatement time to a minimum.

Once the operator's respiratory protection program is in place, extend the citation's abatement date to allow a reasonable time to utilize engineering or administrative controls. You do not need to modify the standard number, 56/57.5001(a)/.5005, when the operator has the respiratory protection program in place.

Initially write the citation to require feasible engineering or administrative controls provided the overexposed miner was already wearing an appropriate respirator and the operator had an appropriate respiratory protection program. The operator may use an appropriate respirator and respiratory protection program instead of such controls when the miner is installing controls or occasionally enters hazardous atmospheres to perform maintenance or investigation.

Terminate a citation when the use of administrative or engineering controls reduces the miner's exposure to the contaminant's enforcement level. If the miner's exposure exceeds the enforcement level, citations can only be terminated when the operator has used all feasible engineering and administrative controls, has an appropriate respiratory protection program, and the miner is wearing an appropriate respirator.

If the operator fails to provide an appropriate respirator and implement an appropriate respiratory protection program within the abatement time, and further extension of the abatement time is not warranted, a 104(b) order can be issued. The order can be modified, once an appropriate respirator and respiratory protection program are provided, to allow the operator to continue to operate until feasible administrative or engineering controls are established.

Where MSHA requires a respiratory protection program for compliance, inspectors can cite without resampling if the operator fails to follow the program's requirements. In such a case, cite 56/57.5005 alone as the standard violated.

56/57.5002 Dust, Gas, Mist and Fume Surveys by Mine Operators

The standard requires mine operators to conduct dust, gas, mist and fume surveys as frequently as necessary to determine the adequacy of control measures. The purpose is to help assure that the miners are not exposed to harmful concentrations of airborne

contaminants. This could include carbon monoxide in underground mines, nitrogen oxides after blasting, welding fumes, silica-containing dust, mercury and any other airborne contaminant, especially where there is a history of overexposures. It does not include noise.

There are many methods used to measure airborne contaminants. The sampling and analytical methods used by the mine operator should be consistent with established scientific principles, such as NIOSH recommended methods and comparable to the 1973 ACGIH TLVs.

56/57.5005 Respiratory Protection

Standard 56/57.5001(a) requires that a miner's exposure shall not exceed the permissible limit of any substance on the TLV list. When the TLV is exceeded, standard 56/57.5005 mandates that operators install all feasible engineering controls to reduce a miner's exposure to the TLV. Respiratory protection is required when controls are not feasible, as well as when establishing controls, and during occasional entry into hazardous atmospheres to perform short-term maintenance or investigations. Whenever respirators are required, operators must establish a respirator program containing all elements of the standard, which incorporates ANSI Z88.2-1969. The inspector must evaluate the effectiveness of the respiratory protection in order to determine whether miners are protected from overexposure. If the operator's respiratory protection program fails to include proper selection and fit testing, the .5001(a)/.5005 violation is significant and substantial ("S and S").

Respirator selection directly affects the efficiency of the respirator. Respirators are designed to protect wearers from inhalation of hazardous atmospheres. There are many different types of respirators but each is limited in protection and application. A respirator can only protect against atmospheres for which it is designed. Without proper selection a serious health hazard may occur. A serious hazard may also occur if the respirator, even though properly selected, is not fitted as required by the standard. Fit testing is essential in order to assign the correct model and size respirator to a miner. Otherwise, it is likely that the respirator will leak and the miner will be overexposed to the toxic substance.

There are other factors that should be considered by the inspector on a case-by-case basis when determining whether the violation should be "S and S" with regard to an operator's respiratory protection program. These factors include training, cleaning and sanitizing, and maintenance of respirators.

With regard to listed nuisance particulates and silver metal overexposures between 0.01 mg/m^3 and 0.1 mg/m^3, operators must use engineering controls to reduce exposure to the permissible limit and comply with the respiratory protection requirements of standard 56/57.5005. However, the .5001(a)/.5005 citation for overexposure to nuisance particulates and to silver metal in the above concentration range is not "S and S." Overexposures to soluble compounds of silver, such as silver nitrate, above 0.01 mg/m^3 should be considered "S and S" if adequate protection was not worn.

56/57.5005(a) Use of Certified Mercury Respirators

For mercury vapor, the use of MSHA-NIOSH certified chemical cartridge respirators is required. This is the belt-mounted Comfo II respirator with Mersorb cartridges. The purpose of the belt-mounted design is to allow the wearer to easily observe the saturation indicator on the mercury cartridge. The use of face-mounted MSA Comfo II respirators with Mersorb cartridges is only acceptable in work situations where the breathing tube of the belt-mounted respirator can become a safety hazard, the work performed causes tension on the breathing tube which can break the seal, or the breathing tube is too short for the wearer and provided that visual checks of the cartridge indicators are made every half hour. The checks on the face-mounted respirator can be made by looking into a mirror or by checking the respirator in uncontaminated air. Because leakage of mercury vapor into the respirator cannot be detected by the wearer, it is critical that a good facepiece-to-face seal be maintained and that the indicator be monitored to prevent breakthrough through the cartridges.

56/57.5005(c) Definition of Immediately Harmful to Life

The definition of "immediately harmful to life" in this standard is the same as that of "immediately dangerous to life or health" (IDLH) as defined by NIOSH, which is acute respiratory exposure that poses an immediate threat of loss of life, immediate or delayed irreversible adverse health effects, or acute eye exposure that would prevent escape from a hazardous atmosphere.

57.5039 Maximum Permissible Concentration (Radon Daughters)

Except as provided by standard 57.5005, persons shall not be exposed to air containing concentrations of radon daughters exceeding 1.0 WL in active workings. In enforcing this standard, the error factor for radon daughter sampling of 20% should be taken into consideration. This means that citations are to be issued when the measured radon daughter concentrations are in excess of 1.20 WL.

Also, this standard applies only to active work areas when workers are present or scheduled during the shift and, if workers are not present or scheduled, when evidence is available that other personnel normally enter the work area during the shift.

57.5040 Exposure Records (Radon Daughters)
"Significant and Substantial" Violation

Inadequate recordkeeping may result in excessive exposures to radiation going undetected and unremedied. Where the violation has actually or potentially contributed to this hazard, the citation will be designated "significant and substantial." Generally, such findings will be appropriate where:

1. The operator fails to keep personal exposure records, or

2. The operator has falsified or altered records or continuously understated the accumulated exposures.

Where such failures are the result of the operator's disregard for the recordkeeping requirements, such violation may also be considered unwarrantable.

In cases where no hazard results, a violation shall be cited as a technical violation without "significant and substantial" findings.

Respirator Credit

Where respiratory protection is used pursuant to 57.5044 and in compliance with 57.5005, that is, entry into hazardous areas for reasonable periods of time to establish controls or occasional entry for investigative or maintenance purposes, MSHA will allow respirator credit on mine employees' radon daughter exposure records. Respirators used for protection against radon daughters must be capable of removing 90 percent of the radon daughters from the respired air.

Credit will not be allowed for the wearing of respirators while performing any type of production work, regardless of the radiation levels.

57.5045 Posting of Inactive Workings

Inactive workings in which radon daughter concentrations are above 1.0 WL shall be posted against unauthorized entry and designated by signs indicating them as areas in which approved respirators shall be worn.

This standard applies to inactive workings (e.g., worked-out sections only). Active workings are subject to 57.5039. See 57.2 for the definition of "active workings" and 57.5040(a)(1) for examples of areas considered "active workings." Standards 57.5044 and 57.5046 for respiratory protection apply to both active and inactive workings.

57.5046 Protection Against Radon Gas

Where radon daughter concentrations exceed 10.0 WL, respirator protection against radon gas shall be provided (in addition to protection against radon daughters).

Because of the rare special circumstances of working in atmospheres that contain radon daughters above 10.0 working levels, there are no respirators or gas masks specifically approved by NIOSH for removal of radon gas. A self-contained breathing apparatus or a continuous flow airline (pure-air) respirator would satisfy the requirements of this standard.

57.5047 Gamma Radiation Exposure Records "Significant and Substantial" Violation

Inadequate gamma radiation exposure records may result in undetected and unremedied excessive exposures (see 57.5047(d)). Where the violation of 57.5047 has actually or potentially contributed to this hazard, the resulting citations will be designated "significant and substantial." Generally, such findings will be appropriate where:

1. The operator fails to keep personal exposure records, or

2. The operator has falsified or altered records or continuously understated the accumulated exposures.

Where such failures are the result of the operator's disregard for the recordkeeping requirements, such violation may be considered unwarrantable.

In cases where no hazard results, a violation shall be cited as a technical violation without "significant and substantial" findings.

56/57.5050 Exposure Limits for Noise Compliance Determination

An operator is in compliance with the noise standard when full-shift noise dosimeter readings are less than or equal to 75 percent of the permissible exposure limit (PEL). The operator is also in compliance when all sound level meter (SLM) readings are below 88 dBA. However, when dosimeter readings exceed 50 percent or SLM

readings exceed 85 dBA, advise the operator to provide exposed miners with hearing protection. Studies have shown that hearing loss can occur after prolonged exposures to noise levels above 85 dBA.

Full-shift dosimeter measurements between 75 percent and 132 percent are within the range of uncertainty considering the accuracy of the instrument. When results are in this range, recommend that the operator reduce the miner's noise exposure and provide adequate hearing protection.

The miner is overexposed when noise dosimeter measurements equal or exceed 132 percent, or SLM readings exceed 117 dBA. In determining a miner's exposure, MSHA does not consider the attenuation provided by any hearing protection worn. Issue one citation for each miner found overexposed. However, do not issue a citation if the miner is wearing adequate hearing protection and noise controls are not feasible. You do not need to specify subsection (a) or (b) of 56/57.5050, when writing the standard number on the citation.

The operator must initially provide adequate hearing protection, unless the miner's exposure can be promptly reduced to below 132 percent by using engineering or administrative controls. The citation's abatement date shall initially reflect the time needed to get hearing protection. Once the operator provides the hearing protection, MSHA will extend the abatement date to allow reasonable time for the operator to utilize engineering or administrative controls.

Terminate a noise citation when the operator has reduced the miner's full-shift exposure to below 132 percent. A citation can also be terminated, regardless of the miner's noise exposure, once the operator has used all feasible engineering and administrative controls and the miner is wearing adequate hearing protection.

If the operator fails to provide adequate hearing protection within the abatement time, and further extension of the abatement time is not warranted, a 104(b) order can be issued. The order can be modified, once adequate hearing protection is provided and worn, to allow the operator to continue to operate until feasible administrative or engineering controls are established.

Where MSHA requires the continued wearing of adequate hearing protection for compliance, inspectors can cite without resampling if they find the miner not wearing it.

In only ONE situation can inspectors use an SLM to terminate a citation originally based on a dosimeter sample. This is when there is a SINGLE, IDENTIFIABLE source of exposure. The inspector must take enough SLM readings to be sure that the noise levels do not exceed 90 dBA AT ANY TIME. Do not use an SLM to terminate citations where employees are operating mobile equipment.

Completing Gravity Section (Item 10.A-10.D) of Form 7000-3:
Under Item 10.A (Likelihood), when a worker's noise exposure exceeds the permissible limit and hearing protection is not being worn, or it is being worn but determined to be inadequate, the likelihood of an injury (permanent hearing loss) occurring would be either reasonably likely, highly likely or occurred. The degree would depend upon the extent of exposure and whether the employee had incurred any work-related hearing loss. Accident/injury reports could be used in determining if any reportable work-related hearing loss had occurred.

When adequate hearing protection is being worn, the likelihood of an injury or illness occurring would be either unlikely or no likelihood.

Under Item 10.B (severity), overexposure to noise should be marked permanently disabling for the injury (permanent hearing loss) resulting from or contemplated by the occurrence of the event.

Item 10.C (significant and substantial) would be marked "yes" if adequate personal hearing protection is not worn. If adequate hearing protection is being worn, the violation would usually not be significant and substantial.

Under Item 10.D (Number of Persons Affected), for most situations, indicate the number of workers sampled. However, there are situations where more should be indicated. For example: if additional workers perform the same job on other shifts; if several workers rotate during a shift to perform the same jobs; or if several overexposed workers within the same area are exposed to one specific noise source.

Commission Decisions[1]

[1]Secretary of Labor v Callanan Industries, Inc., 5 FMSHRC 1900 (1983); Secretary of Labor v Todilto Exploration and Development Corporation, 5 FMSHRC 1894 (1983).

In leading MSHA noise cases, the Federal Mine Safety and Health Review Commission (Commission) interpreted standard 56/57.5050 as requiring the implementation of all feasible controls prior to relying on personal protective equipment. A control need not reduce exposure to within the permissible exposure limit (PEL) in order to be feasible, as long as there is a significant reduction (generally 3 dBA or more). A control according to the Commission is considered feasible when: (1) the control reduces exposure; (2) the control is technologically achievable; and (3) the control is economically achievable.

MSHA must determine economic feasibility prior to requiring engineering controls by assessing whether the cost of the control is wholly out of proportion to the expected benefits. Consistent with the Commission noise decisions, MSHA considers "whether the control can be expected to achieve any significant result, and whether the costs are so great" that it is "irrational" to require its use to achieve those results. The Commission expressly stated that cost-benefit analysis is unnecessary in order to determine whether a noise control is required.

A control according to the Commission is technologically achievable if through reasonable application of existing products, devices or work methods with human skills and abilities, a workable engineering control can be applied to the noise source. The control does not have to be "off-the-shelf" but it must have a realistic basis in present technical capabilities.

The Commission further ruled that in order to establish a prima facie violation of the noise standard, the Secretary must provide sufficient credible evidence as to the following: (1) the existence of an overexposure; (2) the existence of a technologically achievable control; (3) the estimated reduction in noise levels which would result; (4) a rough estimate of the expected cost of the control; and (5) a demonstration that the cost will not be wholly out of proportion to the expected benefits, i.e., it would not be irrational to require use of the control.

Feasible Engineering Controls

Before citing 56/57.5050(b), MSHA inspectors must determine that feasible administrative or engineering controls exist that the mine operator could have utilized to reduce employee noise exposure. Appendix A, Volume IV, MSHA Program Policy Manual, lists feasible controls for several types of mining machinery used in metal and nonmetal mines. Most of the controls listed in Appendix A are in use throughout the metal and nonmetal mining industry and have been referenced by MSHA in prior noise control

documents. Also included are more recently developed noise controls that MSHA has evaluated under actual mining conditions and found to be effective. MSHA believes the listed controls are currently the most effective in reducing employee noise exposure. Due to the large variety of mining equipment, mining methods and environmental conditions in metal and nonmetal mines, there may well be circumstances in which a described control is not feasible for a specific application. Recognizing this, MSHA will evaluate such circumstances on a case-by-case basis to determine the feasibility of a listed control.

In applying these controls to specific pieces of equipment, MSHA inspectors should direct any questions on feasibility to their field office supervisor. MSHA field office supervisors should consult with their district managers to ensure that feasibility determinations are consistent with MSHA policy and are uniformly enforced. Personnel in MSHA's Denver Safety and Health Technology Center and Pittsburgh Health Technology Center, can provide information and on-site technical assistance regarding the installation of these controls and controls for other types of mining equipment not specified in Appendix A. Requests for technical assistance should be routed through the MSHA district manager.

Mine operators may use administrative or engineering controls other than those described in Appendix A in order to comply with Metal and Nonmetal's noise standards. However, if such controls do not reduce employee exposure to the PEL, a mine operator shall be cited if MSHA identifies a feasible control which the mine operator failed to utilize that could significantly reduce the employee's exposure.

When cited for failure to install all feasible controls, a mine operator may choose to retire a particular piece of equipment from service and replace it with one that is in compliance. MSHA will allow up to 1 year to retire such equipment, provided that the mine operator gives MSHA a letter of intent to do so. Adequate hearing protection must continue to be worn until the equipment is retired from service. The specific length of time allowed will depend upon factors such as the degree of employee overexposure, cost of the controls, and adequacy of any hearing conservation program that the mine operator may have.

56/57.14213 Ventilation for Welding

This is a work practice standard intended to reduce the concentration of airborne contaminants from welding below levels which may cause health impairment. In ventilation for welding

fume control, local exhaust ventilation is better than dilution ventilation, and general dilution ventilation is better than natural ventilation.

This standard should be cited whenever welding is performed in a confined area without any detectable ventilation. For the health field notes, collect information on the number of persons exposed, type of welding being used, type of rod used, surface welding performed on, description of work area, length of time welding was done, type and use of personal protective equipment, and any other pertinent information.

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57.11050 Escapeways

This standard requires two or more separate escapeways to the surface at every underground mine. However, a second escapeway is recommended, but not required, during the exploration or development of an ore body. In this application, "exploration or development of an ore body" should be used in its narrowest sense, i.e., while an ore body is being initially developed, or development or exploration work is being conducted as an extension of a currently producing mine. Where mining occurs along a mineralized zone and production and development are indistinguishable as separate activities, the standard must be applied as it would to a producing mine.

A violation of 30 CFR 57.11050(a) exists and a citation must be issued whenever fewer than two functional escapeways out of an underground metal or nonmetal mine are available to miners working underground, even if the mine operator has started correcting the condition which caused the second escapeway to be nonfunctional. No violation of 30 CFR 57.11050(a) exists, however, if, upon there being fewer than two functional escapeways, the mine operator immediately initiates a continuous withdrawal of miners to the surface.

A "properly maintained" escapeway is an escapeway that is functional, providing the miners with a safe means of egress to the surface during a mine evacuation. There may be temporary periods when an escapeway is not immediately available, however, the functionality is still intact.

The following examples demonstrate situations that the Agency would consider to be functional escapeways. No violation of 30 CFR 57.11050(a) would exist in these circumstances:

1) When maintenance, repairs, or other interruption of service, and the removal from service does not affect the functional ability of the escapeway to enable miners to reach the surface in an emergency. For example, an interruption of service that would not usually affect the functioning of the escapeway would include the lubricating of hoist ropes, adjustment of hoist gates, replacement of bolts on the shaft guides, or the inspection of shafts, adits, or conveyances. If the functioning escapeway would not be impaired or affected in any way, i.e., if the work being performed or the inspection of the escapeway can immediately be terminated and the miners can

resume using the escapeway, the Agency would consider the escapeway to be "properly maintained."

2) When it is necessary to use the escapeway to lower mining equipment into, or retrieve mining equipment from the mine, and only miners facilitating the lowering or retrieving of mining equipment remain underground. As in the situation of miners working underground to perform maintenance or repair on the escapeway itself, in this situation the escapeway can be rapidly returned to service and only a few miners are stationed underground. The Agency believes that this policy interpretation reflects a reasonable accommodation of the concern for miners stationed underground to have a second escapeway out of the mine and the need to lower and retrieve mining equipment.

In setting an abatement time for any violation described above, an inspector or other authorized agency representative should, at a minimum, consider the following factors: the hazard(s) to miners, the time required to safely evacuate all but necessary maintenance personnel from the mine, the type of self-rescue devices available, the notification of all miners underground of the unavailability of the nonfunctional escapeway (including the instructions for use of the remaining escapeway in the case of an emergency), and the time required to return the affected escapeway to operation. The violation is abated when at least two escapeways are again fully functional or miners are no longer underground.

The second paragraph of this standard directs the positioning of a refuge within 30 minutes of a working place, where an employee cannot safely reach the surface within an hour.

57.11055 Inclined Escapeways

This standard requires an emergency hoisting facility only for that portion of a designated escapeway which is inclined more than 30 degrees and that is more than 300 feet in vertical extent. The vertical extent refers only to a continuous portion of a designated escapeway, and not to a composite of portions each less than 300 feet but more than 300 feet when combined.

Subpart K Electricity

56/57.12006 Distribution Boxes

This standard requires that distribution boxes be provided with a disconnecting device for each branch circuit. Such a disconnecting device shall be equipped or designed in such a manner that it can be determined by visual observation when such a device is open and that the circuit is deenergized. The distribution box shall be labeled to show which circuit each device controls.

A distribution box is defined under "Definitions" in 56/57.2. Many distribution boxes or power centers have a window at each individual circuit where it can be visually determined whether the circuit is deenergized or not. Where plugs are used at the distribution box to provide current for individual circuits, it can be visually determined when these plugs are not connected. When plugs are used, they shall conform to the requirements of standard 56/57.12084.

56/57.12019 Suitable Clearance Around Stationary Electrical Equipment

This standard requires that where access is necessary, suitable clearance shall be provided at stationary electrical equipment or switch gear. The intention of this standard is to provide sufficient access and working space around such electrical equipment to insure worker safety and to avoid contact by persons with electrical components.

The standard is intended to apply to the many and varied situations that do or will exist on mine property. Among the general factors to be considered in determining "suitable clearance" are voltages and conductors (including size), insulation, guards, existing passage or working space, direction of access to electrical components, potential exposure to live or exposed electrical parts, and the grounding of live parts.

The current editions of the National Electrical Code and the National Electrical Safety Code may be used as guidance in determining "suitable clearance." The provisions of the National Electrical Code for safe work clearances around electrical equipment can be found in Article 110 ("Requirements for Electrical Installations") and Article 710 ("Over 600 Volts, Nominal, General"). Part 1 of the National Electrical Safety Code contains two sections that may be of assistance: Section 11 ("Protective Arrangements in Electrical Supply Stations") and Section 12 ("Protective Arrangements of Equipment"). The National Electrical

Code may be obtained from the National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02210. The National Electrical Safety Code (also referred to as ANSI-C2) may be obtained from the Institute of Electrical and Electronics Engineers, Inc., National Bureau of Standards, 345 East 47th Street, New York, New York 10017.
Areas around stationary electrical equipment or switch gear should be restricted to authorized persons. Normal travel by or through such equipment should not be allowed unless no other travelway is available. However, if persons do travel by stationary electrical equipment, standard 56/57.11001 requires that a safe means of access be provided.

56/57.12020 Protection of Persons at Switchgear

This standard requires that dry wooden platforms, insulating mats, or other electrically nonconductive material shall be kept in place at all switchboards and power-control switches where shock hazards exist. However, metal plates on which a person normally would stand and which are kept at the same potential as the grounded, metal, non-current-carrying parts of the power switches to be operated may be used.

Switchgear, regardless of voltage, which has exposed energized parts should have insulating platforms or mats. See paragraph 3 below.

1. Low voltage (650 volts or less) switchgear which is completely enclosed in metal enclosures does not normally present a shock hazard if the metal enclosures are well grounded. Metal enclosures are well grounded if two or more good paths to ground are ground wire, rigid steel conduit, grounded building steel, or cable armor. Any combination of these examples which will provide two or more good paths to ground for fault current would eliminate the need for insulating mats at power switches rated 650 volts or less.

2. High voltage (more than 650 volts) switchgear should be completely enclosed in grounded metal enclosures and provided with grounded operating handles and grounded metal plates, because of the increased hazard presented by the higher voltages. Insulating mats or platforms should be used where shock hazards exist, and where physical conditions (wet, damp, and outdoor locations, etc.) warrant their use. However, at normally dry and well kept indoor installations (substation or switch-

gear) with grounded metal plates, insulating mats or platforms would not provide additional protection.

3. The older type switchgear, regardless of voltage rating, which has exposed energized parts should have an insulating platform or mat with an insulation rating not less than the phase-to-phase voltage of the circuit.

56/57.12028 Testing Grounding Systems

The intent of this standard is to ensure that continuity and resistance tests of grounding systems are conducted on a specific schedule. These tests will alert the mine operator if a problem exists in the grounding system which may not allow the circuit protective devices to quickly operate when faults occur. With the exception of fixed installations, numerous fatalities and injuries have occurred due to high resistance or lack of continuity in equipment grounding systems. These accidents could have been prevented by proper testing and maintenance of grounding systems.

Grounding systems typically include the following:

1. equipment grounding conductors - the conductors used to connect the metal frames or enclosures of electrical equipment to the grounding electrode conductor;

2. grounding electrode conductors - the conductors connecting the grounding electrode to the equipment grounding conductor; and

3. grounding electrodes - usually driven rods connected to each other by suitable means, buried metal, or other effective methods located at the source, to provide a low resistance earth connection.

Operators shall conduct the following tests:

1. equipment grounding conductors - continuity and resistance must be tested immediately after installation, repair, or modification, and annually if conductors are subjected to vibration, flexing or corrosive environments;

2. grounding electrode conductors - continuity and resistance must be tested immediately after installation, repair, or modification, and annually if conductors are subjected to vibration, flexing or corrosive environments; and

3. grounding electrodes - resistance must be tested immediately after installation, repair, or modification, and annually thereafter.

Conductors in fixed installations, such as rigid conduit, armored cable, raceways, cable trays, etc., that are not subjected to vibration, flexing or corrosive environments may be examined annually by visual observation to check for damage in lieu of the annual resistance test. When operators elect to conduct this visual examination as a method of compliance with 30 CFR 56/57.12028, MSHA will require that a record be maintained of the most recent annual visual examination.

Grounding conductors in trailing cables, power cables, and cords that supply power to tools and portable or mobile equipment must be tested as prescribed in the regulation. This requirement does not apply to double insulated tools or circuits protected by ground-fault-circuit interrupters that trip at 5 milli-amperes or less.

Testing of equipment grounding conductors and grounding electrode conductors is not required if a fail-safe ground wire monitor is used to continuously monitor the grounding circuit and which will cause the circuit protective devices to operate when the grounding conductor continuity is broken.

A record of the most recent resistance tests conducted must be kept and made available to the Secretary or his authorized representative upon request. When a record of testing is required by the standard, MSHA intends that the test results be recorded in resistance value in ohms.

56/57.12042 Track Bonding

This standard requires that both rails shall be bonded or welded at every joint, and rails shall be crossbonded at least every 200 feet if the track serves as a return trolley circuit. When rails are moved, replaced or broken bonds are discovered, they shall be rebonded within three working shifts.

A citation for a violation of this standard should not be issued until the end of the third working shift after rails are moved, replaced or a broken bond is discovered. That is, assuming a three shift operation, if a broken bond is discovered on a day shift, the citation shall be issued at the end of the next day shift if the broken bond is still unrepaired. A citation shall not be issued if the bond has been repaired within this period of time.

The bonding (or welding) of the rails shall be completed before any new installation of track is placed in regular or production operation. In a new area of the mine or major track installation, the bonding of both rails shall be completed in conjunction with, and progress with, the laying of rail lengths.

57.12082 Isolation of Powerlines

This standard requires that powerlines shall be well separated or insulated from waterlines, telephone lines, and air lines. Additional insulation is not required between powerlines and waterlines, telephone lines, and air lines if the insulation of the powerlines, as provided by the manufacturer, is in its original condition.

When powerlines are found to be in contact with water, telephone, or air lines, a careful check must be made of the condition of the insulation of the entire cable. If the cable contains splices, they must be vulcanized or of an equivalent type. Any insulation splits, cuts or other signs of cable abuse must be repaired in order to eliminate the possibility of "electrical tracking" and in order to make the insulating qualities of the splice or repair approximate the original dielectric quality provided by the manufacturer.

57.12084 Branch Circuit Disconnecting Devices

This standard requires that disconnecting switches that can be opened safely under load shall be provided underground at all branch circuits extending from primary power circuits near shafts, adits, levels and boreholes.

"Branch circuit" means that portion of a wiring system extending beyond the final overcurrent device protecting the system. It follows that any circuit ahead of the branch circuit is considered a primary circuit.

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56/57.13015(b) Records of Inspections of Compressed Air Receivers and Other Unfired Pressure Vessels

Section (b) of standard 56/57.13015 requires that records of inspections made by inspectors holding a valid National Board Commission shall be retained by the mine operator in accordance with the requirements of the National Board Inspection Code (progressive record - no limit on retention time) and shall be made available to the Secretary or his authorized representative.

The recordkeeping requirement may be satisfied by an operator's written statement that the inspections have been made in accordance with the incorporated code. MSHA will accept such a certifying statement annually, without regard to format, if it is made available at the time of inspection.

56/57.13021 High Pressure Hose Connections

This standard requires the use of safety chains or other suitable locking devices at certain high-pressure hose-to-hose or hose-to-machine connections. Quick-coupling connectors are considered to be in compliance with this standard without safety chains or other locking devices if the wire used to hold the connectors is actually in use.

56/57.13030(c) Records of Inspections and Repairs of Boilers

Section (c) of standard 56/57.13030 requires that records of inspection and repairs be retained by the mine operator in accordance with the requirements of the ASME Boiler and Pressure Vessel Code and the National Board Inspection Code (progressive records - no limit on retention time) and shall be made available to the Secretary or his authorized representative.

The recordkeeping requirement may be satisfied by an operator's written statement that the inspection and/or repairs have been made in accordance with the incorporated code. MSHA will accept such a certifying statement annually, without regard to format, if it is made available at the time of inspection.

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Subpart M Machinery and Equipment

56/57.14100 Safety Defects: Examination, Correction, and Records

This standard applies to all off-road and on-road self-propelled equipment used on mine property, including vehicles such as vans, suburbans, and pick-up trucks that are used at mine sites and remain on mine property. In most instances, it does not apply to vehicles used to transport persons between locations off mine property to mine property; however, if such vehicles transport personnel on mine property (e.g., from the gate to various sites at the mine), then such equipment must be inspected.

This standard will not be cited when an audible warning device has been installed on heavy duty mobile equipment at surface mines and surface operations of underground mines, but is inoperative because of electrical or mechanical defect.

Standard .14132 shall be used when the equipment has not been equipped with audible warning devices, or when they have been so equipped, and the device is not operational for whatever reason.

In some cases, mine operators have installed audible reverse alarms on underground equipment because prevailing conditions have dictated the need for a warning device to ensure miner safety. In this instance, Standard .14100 can be considered if the alarm is inoperable or inaudible and the defect can be shown to affect the safety of workers in the area. Surrounding noise levels, confined work areas, and distracting work assignments shall be considered at the time.

56/57.14101(a) Brakes/Minimum Requirements

Subsection (a) is divided into three parts. Part (1) of this subsection sets a minimum performance standard for service brake systems on self-propelled mobile equipment. Part (2) sets a minimum performance standard for parking brakes on self-propelled mobile equipment. Part (3) sets a maintenance standard for all braking systems on self-propelled mobile equipment.

Standard 56/57.14101(a)(1) should be cited if a service brake system is not capable of stopping and holding the equipment with its typical load on the maximum grade it travels.

Standard 56/57.14101(a)(2) should be cited if the parking brakes are not capable of holding the equipment with its typical load on the maximum grade it travels.

Standard 56/57.14101(a)(3) should be cited if a component or portion of any braking system on the equipment is not maintained in functional condition even though the braking system is in compliance with (1) and/or (2) above. It is important to note that if a component or portion of either system renders the equipment incapable of stopping or holding itself with its typical load on the maximum grade it travels, the appropriate standard, 56/57.14101(a)(1) or (2), should be cited.

Separate citations or orders should be issued if violations of 56/57.14101(a)(1) and 56/57.14101(a)(2) are found on the same piece of equipment.

56/57.14107 Moving Machine Parts

All moving parts identified under this standard are to be guarded with adequately constructed, installed and maintained guards to provide the required protection. The use of chains to rail off walkways and travelways near moving machine parts, with or without the posting of warning signs in lieu of guards, is not in compliance with this standard.

Conveyor belt rollers are not to be construed as "similar exposed moving machine parts" under the standard and cannot be cited for the absence of guards and violation of this standard where skirt boards exist along the belt. However, inspectors should recognize the accident potential, bring the hazard to the attention of the mine operators, and recommend appropriate safeguards to prevent injuries.

This standard is to be cited when a guard at conveyor locations does not extend a distance sufficient to prevent any parts of a person from accidentally getting behind the guard and becoming caught, or in those instances when there is no guard at the conveyor-drive, conveyor-head, conveyor-tail, or conveyor take-up pulleys.

56/57.14109 Unguarded Conveyors With Adjacent Travelways

A travelway, as referred to in this standard, is a regular travelway immediately adjacent to the conveyor. If a conveyor has a travelway on both sides, whether it is elevated or at ground level, both sides must meet the requirements outlined in the standard.

When emergency stop devices or cords are not present, a guard must be provided along the full length of the conveyor between the belt and the travelway. The conveyor installation or framework also cannot be considered an allowable guard even though it may conform to the standard railing height of 42 inches.

Guards or railings shall be constructed or placed to make all moving parts of the conveyor inaccessible to persons using the adjacent travelway. A substantial handrail on the belt side of the travelway can be acceptable provided that it meets the above criteria.

The primary consideration in installing an emergency stop device or cord is to protect the person on the adjacent travelway; however, it is doubly beneficial if it can be installed so that an individual on the belt can also reach it.

56/57.14130 and 56/57.14131 Providing, Maintaining, and Wearing Seat Belts

In an effort to reduce the severity of powered haulage accidents, district managers shall carefully consider the gravity and negligence of citations and orders issued for the failure to provide, maintain, or wear seat belts.

Gravity: The failure to provide, maintain, or wear seat belts is a serious safety hazard and under most circumstances should be a significant and substantial violation. Without mitigating circumstances, the gravity evaluation of reasonably likely or highly likely, and fatal would usually be justified.

Negligence: The failure to provide seat belts as required by the regulations may be considered highly negligent and therefore be the basis for a 104(d) citation/order in the absence of mitigating circumstances.

Failure to maintain seat belts in functional condition may be considered less negligent than the failure to provide seat belts. Some factors that could increase the degree of negligence are if the defect has been reported on a preshift examination, the defect is obvious, or the defect has existed for a long period of time. The examination of seat belts for defects is required by 30 CFR 56/57.14100.

Negligence for failure to wear seat belts should be determined by the extent of the mine operator's efforts to enforce the seat belt requirement. Examples of such efforts may include:

1. evidence that the equipment operators are instructed on the mandatory use of seat belts;

2. regular observation by supervisors to determine whether seat belts are being worn;

3. corrective action taken by supervisors when seat belts are not being worn; and

4. the development and implementation of a job safety analysis program to reinforce task training for equipment operators.

If the mine operator does not make any effort to ensure that seat belts are worn, the negligence would be high and a 104(d) citation/order would be appropriate. If, however, the mine operator's conduct indicated an effort to have seat belts worn, the negligence would usually be less than high.

Special Assessment: All citations/orders issued for failure to provide, maintain, or wear seat belts should be reviewed for special assessment. The types of violations that meet the requirements for special assessments are:

1. violations cited as contributing to a serious injury or fatality;

2. violations cited as an unwarrantable failure;

3. violations cited as an imminent danger; or

4. violations evaluated as having extraordinarily high gravity (highly likely and fatal).

56/57.14132(a) and (b) Horns and Backup Alarms For Surface Equipment

Standard 56/57.14132(a) sets a maintenance standard for manually operated horns or other audible warning devices that are provided as safety features on self-propelled mobile equipment. The self-propelled mobile equipment referenced in this subsection includes any wheeled, skid-mounted, or track-mounted equipment capable of moving itself. This standard should be cited if any audible warning device that was provided on the equipment as a safety feature is not functional. This includes manually-operated horns, automatic reverse-activated signal alarms, wheel-mounted bell alarms and discriminating backup alarms.

Standard 56/57.14132(b) pertains only to self-propelled mobile equipment where the operator has an obstructed view to the rear. A backup alarm system is only required when there is an obstructed view to the rear and an observer has not been provided. Standard 56/57.14132(b)(1) must be cited if an observer is not present and a backup alarm system is not provided on the equipment. Standard 56/57.14132(b)(2) must be cited if an observer is not present and

a backup alarm system is provided and is operating as designed (functional) but is not audible above the surrounding noise level.

56/57.14201 Conveyor Start-Up Warning

This standard requires that no conveyor is started unless the person starting it is certain that all persons are clear. A positive audible or visible warning system is required to provide necessary flexibility to accommodate different mining and milling conditions throughout the nation. This standard has been uniformly interpreted by MSHA, and its predecessor organizations, to include both automatic and manual conveyor alarm systems as long as these systems are effected at each conveyor or series of conveyors within a system. However, MSHA and many mine operators believe that an automatic warning and start-up system is more effective than a manual system and, therefore, should be the system of preference. An automatic conveyor alarm system, or a system designed to first activate a start-up horn before the start-up system of the conveyor, is more effective in eliminating human error at the time of a conveyor start-up than a manual system.

A manual conveyor alarm system is one which actuates an audible alarm by an independent switch and uses a separate switch to actuate the conveyor. It may be considered "positive" and in compliance with the standard provided the system is capable of effectively warning persons prior to the time the conveyor will be started. Operators should be instructed to assure that persons are clear before starting the conveyor or conveyor system.

Although the standard specifies either an audible or visible warning system, visual warnings in bright sunlight or other well-lighted places are ineffective. For this reason, it is recommended that an audible warning system (horn) be used throughout a conveyor system located in bright sunlight or other well-lighted places. The duration of the audible warning shall be long enough to allow anyone who is endangered by an activated conveyor system to move to safety.

Particular attention must be given to the scope, or the overall effectiveness of the audible warning system, to be certain that the warning is effective at each and every conveyor in the system. This does not mean that a separate horn or similar device must be installed for each conveyor, but it does mean that the warning must be positive and effective for each conveyor or series of conveyors capable of being shut down or started independently within the system.

This standard specifically exempts those conveyor systems visible from the start-up switch from the requirements of a positive start-up warning system. However, MSHA recommends that all conveyor systems have a positive audible or visible start-up warning even though they are visible from the start-up switch.

56/57.14211 Blocking Equipment in Raised Position

Standards 56/57.14211 prohibit persons from working on, under, or from raised portions of mobile equipment or a component of mobile equipment until the equipment has been blocked or mechanically secured. The standards specifically require blocking of raised components to prevent a "free and uncontrolled descent" in the event of a sudden failure of the system holding up the raised component. Hydraulic telescoping boom cranes with flow restrictions or check valves in the hydraulic system will prevent a free and uncontrolled descent of the boom and attached work platform.

Compliance with 56/57.14211 can also be achieved by mine operators if the following four safety features are implemented when hoisting personnel with cranes:

1. use of an anti-two-block device with automatic shutdown capabilities that will prevent breaking of the load or whip line in the event of a two-block condition (a horn or light warning in lieu of automatic shutdown is not sufficient);

2. all running ropes, other than rotation resistant ropes, must have a safety factor of at least 7;

3. rotation-resistant ropes must have a safety factor of at least 10; and

4. the cranes used to hoist personnel must be equipped for and operated with controlled load lowering and must not be capable of being operated in "free fall."

MSHA strongly recommends that miners avoid working near or on cranes unless there is no other means of performing the task, or the other means creates a greater hazard.

56/57.14213 Ventilation for Welding

See Subpart D, Air Quality, Radiation, and Physical Agents.

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Subpart N Personal Protection

56/57.15001 First Aid Materials

This standard requires that adequate first-aid materials, including stretchers and blankets, shall be provided at places convenient to all working areas, and that water or neutralizing agents shall be available where corrosive chemicals or other harmful substances are stored, handled or used.

The purpose of this mandatory standard is to ensure that adequate first-aid materials, including eye wash solution, safety showers (not just "deluge" showers, but a constant warm water supply for long-term flushing) and other neutralizing agents are available to workers where corrosive chemicals or other harmful substances are stored, handled, or used. Neutralizing agents shall be readily available for first-aid treatment and cleanup of corrosive chemical spillage or leakage. Spill-control products are commercially available for all hazardous chemical substances. These products both absorb and neutralize hazardous chemicals, thereby reducing the hazard to workers while containing the spilled chemicals.

56/57.15003 Protective Footwear

This standard requires that all persons shall wear suitable protective footwear when in or around an area of a mine or plant where a hazard exists which could cause injury to the feet.

The standard considers the existence of a hazard to the feet as the basic criterion necessitating the wearing of protective footwear. Inspectors should carefully examine the work areas and procedures to make this determination. However, it is rare that such hazards are not encountered in mining or milling operations.

Most mining company safety requirements for protective footwear are more stringent than the MSHA standard. A company policy requiring everyone to wear protective footwear at all times at the mining operation is much easier to implement and provides better protection than determining individual situations where protective footwear is required.

MSHA's standard does not define protective footwear. MSHA considers substantial hard-toed shoes or boots to be the minimum protection acceptable for most mining applications. There may be times when special purpose foot protection, such as metatarsal protectors, is needed. There may also be some instances where heavy leather shoes or boots will provide adequate safety for the feet.

56/57.15004 Eye Protection

This standard requires that all persons shall wear safety glasses, goggles or face shields or other suitable protective devices when in or around an area of a mine or plant where a hazard exists which could cause injury to unprotected eyes.

Photo-gray lenses which comply with ANSI Z87.1-1979 for impact and shatter resistance and frame construction would meet the requirements of this standard. However, these lenses do not meet the requirements for radiant energy generated during electric arc welding or gas flame cutting and, therefore, are not acceptable for these uses. Additionally, their use underground or at night is not advisable because most photo-gray lenses respond too slowly to changes in light level and may not lighten rapidly enough to provide unimpaired vision when traveling from a well-lighted area to a dark area.

56/57.15006 Protective Equipment and Clothing for Hazards and Irritants

This standard requires that special protective equipment and special protective clothing shall be provided, maintained in a sanitary and reliable condition, and used whenever hazards of process or environment, chemical hazards, radiological hazards, or mechanical irritants are encountered in a manner capable of causing injury or impairment.

The standard is intended to cover obvious work situations where the normal and ordinary work clothing and safety equipment provided by the miner for his/her own protection is not adequate to provide the level of protection required for the work being done. Usual items, such as safety glasses, hard hats, and safety-toed shoes, would not normally come under this standard.

Unusual items for conditions requiring extra protective measures could include aprons, rubber gloves, asbestos blankets, leg shields, protective creams, solvent impermeable coveralls, and other items such as tag lines, safety belts and lines. These must be maintained in a clean and reliable condition, ready for use.

The inspector must exercise considerable judgement in the enforcement of this standard. It is not feasible to develop a policy which covers all conceivable circumstances. However, as guidelines to enforcement, protective clothing would definitely be required if the worker experiences any irritation no matter how slight. Also, skin protection would definitely be required when exposed to chemicals that bear a "skin" notation in the TLV booklet,

even if the exposure is only 5 minutes a day and the worker does not exhibit any irritation.

57.15030 Provisions and Maintenance of Self-Rescue Devices

This standard requires that a 1-hour self-rescue device approved by MSHA shall be made available by the operator to all personnel underground and that each operator shall maintain self-rescue devices in good condition.

While the detection and reporting by miners of defective self-rescuers is a part of the training program required under CFR 57.18028, the operator has the final responsibility to see that all self-rescue devices are fully operable and to replace them immediately if they are defective. This responsibility can be discharged successfully only through a regular inspection program conducted by the operator, supplemented by the training of each miner to recognize and report defective self-rescue devices.

The operator needs an effective inspection program to ensure that each self-rescue device is maintained in "good condition." An effective inspection program established by the operator must include visual inspection and weighing. Visual inspection serves to identify surface defects such as a crushed case or dented seal. The operator's inspection program should also provide for the weighing of each self-rescuer at least every 90 days and for keeping a record of weighing for each device.

A self-rescuer is weighed by first cleaning the device, i.e., scraping off debris and wiping with a damp cloth, and then placing it on the balance. The balance used for weighing must have a capacity of at least 1100 grams and an accuracy of $\pm$1 gram. The current weight is compared with the manufacturer's weight stamped or etched in the self-rescuer case.

Self-rescue devices shall be removed from service if the device has a crushed or deeply dented case, the device has dents or damage around the seal area, or the device has a weight gain of 10 grams or more above the weight imprinted on the self-rescuer case.

Citations for violations will be issued for all self-rescuers which are not found to be in "good condition" as required by this standard.

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56/57.16003 Storage of Hazardous Materials and
56/57.16004 Containers for Hazardous Materials

Standard 56/57.16003 requires that materials that can create hazards if accidentally liberated from their containers shall be stored in a manner that minimizes the dangers. Standard 56/57.16004 requires that hazardous materials shall be stored in containers of a type approved for such use by recognized agencies and that such containers shall be labeled appropriately.

Potential hazardous materials exist and are used throughout most mining and milling processes. Such materials must be properly and securely stored, based on the type of potential hazard (e.g., toxic, corrosive, flammable). The container must be appropriately labeled showing the contents.

Commercially supplied materials are generally labeled by the distributor. Unstable cabinets and shelves containing hazardous chemicals shall be securely fastened and made stable.

Corrosive substances are those that cause visible destruction or irreversible alterations to the body tissue on contact. Acids and corrosive chemicals shall not be stored with alkalies or solvents or stored on shelves above eye level. Common corrosive chemicals are mineral acids, e.g., hydrochloric (HCl), hydrofluoric (HF), nitric (HNO_3), sulfuric (H_2SO_4), acetic (CH_3COOH), etc., and basic solutions, e.g., sodium (NaOH), potassium (KOH) and ammonium (NH_4OH) hydroxides, etc.

Concentrations of solvent and other flammable vapors shall be kept at a minimum by ventilation of storage areas. Flammables shall be stored in a cool place away from all ignition sources, such as open flames, hot plates and sparking electrical equipment. There shall be no smoking in areas of solvent use or in any other flammable storage areas.

56/57.16016 Lift Trucks

This standard provides that fork and other similar types of lift trucks shall be operated with the: (a) Upright tilted back to steady and secure the load; (b) Load in the upgrade position when ascending or descending grades in excess of 10 percent; (c) Load not raised or lowered enroute except for minor adjustments; and (d) Load-engaging device downgrade when traveling unloaded on all grades.

The requirement that load-engaging devices when empty be placed in a downgrade position when traveling on all grades reflects the accepted safety practice of traveling or tramming with the load-

engaging mechanism as low as possible. This practice is set forth in Chapter 22, Powered Industrial Trucks, Industrial Safety, published by the National Safety Council and is also a requirement of the Occupational Safety and Health Administration, Standard 29 CFR 1910.178(n)(i), (ii), and (iii). In most situations when tramming without a load, the load-engaging mechanism should be kept as close to the ground as safety permits. However, in situations where adjustments will be necessary to facilitate safe operation of the vehicle (e.g., when traveling on inclines, declines or over rough terrain), the load-engaging mechanism may be adjusted enroute.

56/57.18002 Examination of Working Places

30 CFR '' 56/57.18002, Examination of working places, provide:

(a) A competent person designated by the operator shall examine each working place at least once each shift for conditions which may adversely affect safety or health. The operator shall promptly initiate appropriate action to correct such conditions.

(b) A record that such examinations were conducted shall be kept by the operator for a period of one year, and shall be made available for review by the Secretary or his authorized representative.

(c) In addition, conditions that may present an imminent danger which are noted by the person conducting the examination shall be brought to the immediate attention of the operator who shall withdraw all persons from the area affected (except persons referred to in section 104(c) of the Federal Mine Safety and Health Act of 1977) until the danger is abated.

MSHA intends that the terms "competent person" and "working place," used in §§56/57.18002(a), be interpreted as defined in §§ 56/57.2, Definitions.

A "competent person," according to '' 56/57.2, is "a person having abilities and experience that fully qualify him to perform the duty to which he is assigned." This definition includes any person who, in the judgment of the operator, is fully qualified to perform the assigned task. MSHA does not require that a competent person be a mine foreman, mine superintendent, or other person associated with mine management.

The phrase "working place" is defined in 30 CFR '' 56/57.2 as: "any place in or about a mine where work is being performed." As used in the standard, the phrase applies to those locations at a mine site where persons work during a shift in the mining or milling processes.

Standards 56/57.18002(b) require operators to keep records of working place examinations. These records must include: (1) the

date the examination was made; (2) the examiner's name; and (3) the working places examined. MSHA intends to allow operators considerable flexibility in complying with this provision in order to minimize the paperwork burden. Records of examinations may be entered on computer data bases or documents already in use, such as production sheets, logs, charts, time cards, or other format that is more convenient for mine operators.

In order to comply with the record retention portion of §§ 56/57.18002(b), operators must retain workplace examination records for the preceding 12 months. As an alternative to the 12-month retention period, an operator may discard these records after MSHA has completed its next regular inspection of the mine, if the operator also certifies that the examinations have been made for the preceding 12 months.

Evidence that a previous shift examination was not conducted or that prompt corrective action was not taken will result in a citation for violation of §§ 56/57.18002(a) or (c). This evidence may include information which demonstrates that safety or health hazards existed prior to the working shift in which they were found. Although the presence of hazards covered by other standards may indicate a failure to comply with this standard, MSHA does not intend to cite §§ 56/57.18002 automatically when the Agency finds an imminent danger or a violation of another standard.

57.18028 Mine Emergency and Self-Rescuer Training

This standard applies to underground mines only and states that all persons who are required to go underground shall be instructed in MSHA's approved course in mine emergency training. In addition to regular underground employees, the phrase "all persons who are required" shall be construed to mean those persons who through their duties must intermittently work underground even though their primary functions are on the surface. These include, but are not limited to engineers, surveyors, electricians, mechanics, maintenance personnel or laborers who repair, maintain, install, or perform their job assignments underground when necessary.

All persons who go underground, whether routinely or on occasion, shall be instructed in a course in either the MSA W-65 Self-Rescuer or the Permissible Draeger 810 Respirator for Self-Rescue. After the initial instruction, any person who has not had instruction in the use of either of these devices within the immediately preceding 12 months shall receive such instruction prior to going underground.

In instances where individuals who are infrequent visitors are permitted to go underground in the accompaniment of responsible and trained company personnel, these individuals would not be required to take the approved course in mine emergency training prior to going underground. In lieu of the approved course on self-rescuers, the individual or individuals entering the mine shall have been instructed in the use of the self-rescuer informally by a person trained in the use of this equipment.

The instruction shall be given by an MSHA instructor or by an instructor certified by the district manager. Provisional approval, in regard to the instruction of new employees, shall be interpreted to mean those company personnel who have received additional training under a cooperative plan, but who have not as yet been certified as instructors under such plan, and who can give the necessary instructions when the services of an MSHA or other certified instructor cannot be obtained.

Recordkeeping Requirements

This standard (underground only) specifies that all persons who are required to go underground be instructed on an annual basis in MSHA approved courses contained in the Bureau of Mines instruction guide 19 "Mine Emergency Training"; and instruction guide 2, "MSA W-65 Self-Rescuer" or instruction guide 3, "Permissible Draeger 810 Respirator for Self-Rescue." Records of all instructions are required to be kept at the mine site or at the nearest mine office for two years, and copies must be submitted to MSHA. 30 CFR Part 48.9 (Records of Training) requires an operator, upon a miner's completion of each MSHA approved training program, to record and certify that the miner has received the specified training.

The recordkeeping requirement of this standard may be satisfied by meeting the recordkeeping requirement contained in 30 CFR Part 48.9.

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56/57.19025 Hoist Rope Load End Attachments

The standard requires, in part, that wire rope shall be attached to the load by a method that develops at least 80 percent of the nominal strength of the rope. The short-coupled thimble attachment (see attached diagram) has been evaluated as being safe, and it is acceptable for personnel and material hoisting applications for hoist rope of 1-inch, 1-3/8 inch and 2-1/8 inch diameters, subject to the following conditions:

1. Repair and replacement parts are manufactured from the specified material and are within the engineering dimensions and tolerances specified by the manufacturer.

2. The manufacturer's assembly instructions are followed.

3. A weekly inspection procedure for slippage is conducted.

56/57.19045 Metal Bonnet

Metal bonnets shall be provided above those cages and skips specifically designed for man hoisting and above those work platforms, stages, or other temporarily or permanently installed shaft conveyances used by workers for shaft inspection, maintenance, or repairs.

Safety ropes or belts shall be worn at all times by shaftmen doing shaft work (56/57.15005).

56/57.19083 Overtravel Backout Device

The manufacturer of any hoist should be able to furnish material or information on a device or interlock that will comply with the requirements of the standard. The device prevents a conveyance or counterbalance from moving until the motor has developed enough power to move the conveyance in the right direction.

56/57.19120 Procedures for Inspection, Testing, and Maintenance

During MSHA inspections, the inspector shall observe while the hoisting engineer makes actual tests on hoisting equipment to determine the adequacy of overspeed and overtravel controls, braking mechanisms, limit switches, deadman controls, and position indicators. Prior to making these tests, all personnel shall be removed from the man cages or other locations which

would be hazardous in the event of mechanical failure. When checking the overtravel controls, the first test should be made with the hoist at a low speed to determine if the brakes are functioning and the power circuit is deenergizing. The second test shall be made with the hoist running at normal operating speed.

The inspector should observe these tests at a time that is convenient to the mine operator. This could be at shift changes or at some other convenient time.

Refusal by an operator to make necessary tests in the inspector's presence constitutes an admission of failure of the safety devices. An order shall be written prohibiting the use of the hoist until the necessary adjustments or repairs have been made and the hoist tested in the inspector's presence.

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Subpart S Miscellaneous

56/57.20002 Potable Water

This mandatory standard is to ensure that potable drinking water is supplied and made available to all workers during working hours in all active working areas to prevent water-deficiency related illness and to prevent workers from drinking ground water which could be contaminated. The common drinking cup is prohibited in order to prevent the spread of communicable diseases. Containers from which drinking water must be dipped are prohibited because cups can contaminate the entire water supply. Containers from which water must be poured are prohibited because size and weight of containers encourage dipping. When water is cooled by ice, the ice shall either be made from potable water or shall not come in contact with the water in order to prevent contamination. Potable water outlets shall be posted to distinguish them from nonpotable water outlets. Potable water systems shall be constructed to prevent backflow or backsiphonage of non-potable water in order to prevent contamination.

The inspector should take a sample of the drinking water and have it analyzed for potability when complaints are received or when contamination is suspected. Contamination of potable water may be suspected when the potable water has unusual physical characteristics such as color, odor, or taste; when there are indications of bacteriological, chemical or radiological contamination of drinking water supplies; and/or when cross connections or backsiphonage is evident.

Potable water means water which shall meet the applicable minimum health requirements for drinking water established by the State or community in which the mine is located or by the Environmental Protection Agency in 40 CFR Part 141, pages 169-182, revised as of July 1, 1977. Where no such requirements are applicable, the drinking water provided shall conform with the Public Health Service Drinking Water Standards, 42 CFR Part 72, Subpart J, pages 527-533, revised as of October 1, 1976.

Local health authorities or a Safety and Health Technology Center should be contacted for guidance concerning water analysis.

56/57.20005 Carbon Tetrachloride

Carbon tetrachloride is a known carcinogen, and it is therefore prohibited for use on mine properties. There are adequate

substitutes available for all relevant mining operations. Inspectors are to inform the Chief of the Health Division in Arlington when carbon tetrachloride is encountered on a mine property.

56/57.20008 Toilet Facilities

This mandatory standard is to ensure that toilet facilities be provided and readily accessible to workers. Toilet facilities shall be kept clean and sanitary to prevent the spread of communicable disease. Determinations regarding readily accessible locations, cleanliness and sanitary conditions, and the number of separate toilet rooms required, are to be made by the mine inspector.

56/57.20011 Barricades and Warning Signs

This mandatory standard is to ensure that barricades are provided or warning signs posted to alert workers and other persons and to prevent them from inadvertently entering areas in which health or safety hazards exist but are not obvious. Examples of health hazards are heat, acids, gases, dusts, noise, and radiation. All areas of a mine or mill should be checked for imperceptible health hazards. Storage facilities, laboratories, dumps, and tailings commonly contain toxic substances.

Warning signs are posted for the purpose of describing particular hazards and indicating precautions to be followed in order to avoid injury and illness.

56/57.20012 Labeling of Toxic Materials

This mandatory standard is to ensure that toxic materials that are used, discarded as a by-product, or stored during mining or milling processes, be plainly marked or labeled in order to positively identify the nature of the safety or health hazard and the protective action required to prevent injury and illness. Toxic materials can produce injury or illness through ingestion, inhalation, and absorption. As the chemical, physical, and toxicological properties vary among toxic materials, each one must be treated and handled on an individual basis. Labels can include the chemical, physical, and/or toxicological properties of the substances as well as precautions and personal protective equipment required for safe use and handling. Precautionary labeling should be classed "CAUTION", "WARNING", or "DANGER", depending on the severity of the hazard associated with a particular toxic material.

There are ten separate hazard classes which should be considered under these standards. They are: explosives, compressed gases, flammable liquids, flammable solids, oxidizers, irritants and poisons, radioactive materials, corrosives, biohazards and carcinogens. These materials may be commonly found in dump sites, storage areas, laboratories, and bag and drum containers.

57.22302, .22303, .22304, .22305 Minimum Air Quantity Formula for Gassy Metal/Nonmetal Mines Operating Multiple Diesel Units

MSHA's regulations specify that when a single unit of permissible diesel equipment is used in a gassy metal and nonmetal mine, the required "minimum" quantity of ventilating air is specified on the machine's approval plate, 30 CFR 36.45(a). This quantity is applicable only when one machine is operated.

According to a formula developed by the Bureau of Mines, the total ventilation for multiple units need not be the sum of the recommended rates for all the individual approved units. This formula is based on available evidence which suggests that while one unit is operating under a heavy load, the engines of other units being loaded are normally idling. MSHA has adopted, and will uniformly apply this formula to all "gassy" metal and nonmetal mines when two or more diesel units are operated in the same airway or split of air. MSHA will accept this formula as meeting the requirements for "minimum" air quantity as long as airborne contaminants remain below the listed TLV.

The minimum air volume formula is expressed:

$$_{QT} = 100\% \, Q_1 + 75\% \, Q_2 ..... + 50\% \, Q_n$$

Where:

Q_T = Total air quantity required;

Q_1 = the permissibility volume rating for largest rated diesel unit;

Q_2 = the permissibility volume rating for the next largest rated diesel unit; and

Q_n = the combined permissibility volume ratings for all additional diesel units.

The examples set forth below illustrate the use of the formula for determining required air quantity, in cubic feet per minute, when two or more diesel units are used in the same airway or

split of gassy mines. The examples are for one underground mine with five diesel units operating on the upper level in the main haulageway and three diesel units operating on the lower lever in the 1400 haulageway.

Upper Level, Main Haulageway

Eng. Mfg.	Unit	hp	Air Req'd for Single Unit(cfm)	Adjustment for multi-use combination	
GM	1	227	46,000	x 1	46,000 cfm
GM	2	197	40,000	x .75	30,000
GM	3	160	32,000	x .50	16,000
GM	4	119	24,000	x .50	12,000
Deutz	5	196	31,000	x .50	15,500
		Total cfm required.....			119,500 cfm

Lower Level, 1400 Haulageway

Eng. Mfg.	Unit	hp	Single Unit (cfm)	Adjustment for multi-use combination	
GM	1	227	46,000	x 1	46,000 cfm
Duetz	2	196	31,000	x .75	23,250
Caterpillar	3	100	14,500	x .50	7,250
		Total cfm required.....			76,500 cfm

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Appendix A

Descriptions of Feasible Noise Controls

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Surface Self-Propelled Equipment

MSHA considers the following engineering noise controls, or a combination of these controls, to be feasible and effective in most circumstances to reduce the noise exposure of employees operating surface self-propelled equipment (for example, dozers, front-end loaders, trucks, graders, scrapers, etc.):

- acoustically treated cabs (primarily on equipment manufactured since the mid-1970s);
- exhaust mufflers and redirect the exhaust pipe away from the operator;
- noise barriers (windshields); and
- acoustical treatment of the operator's compartment and firewall.

Among these controls, a well designed and constructed acoustically treated cab and a properly treated exhaust system are the most effective and the most likely to reduce employee noise exposure to the PEL. MSHA generally considers acoustically treated cabs to be feasible provided: (1) a cab is available for that particular piece of equipment; (2) there are no significant technical or safety problems caused by the installation of a cab; (3) its installation would not require modification to, or alteration of, the equipment's roll-over protection (ROPs) in any way that would affect the ROP's certification; and (4) its use will significantly reduce the employee's noise exposure.

A well designed and constructed acoustically treated factory cab can reduce employee noise exposure by more than 10 dBA. Generally, retro-fit cabs will exhibit somewhat less noise reduction. Although such cabs are the single most effective noise control, on some particularly noisy equipment an acoustically treated cab may not reduce noise levels to the PEL. In these cases, administrative controls or other engineering controls, such as an exhaust muffler and acoustical treatment of the firewall, would need to be evaluated to determine if they could further reduce the employee's noise exposure. If, after using all feasible controls, employee exposure still exceeds the PEL, then adequate hearing protection would have to be provided and worn.

There may be limited applications, where, based upon the amount of time the equipment is used during the employee's work shift and the degree of noise overexposure, controls other than a cab may be able to reduce employee exposure to the PEL. Such

controls are described below. However, if a mine operator chooses to use such controls and the employee's noise exposure remains significantly above the PEL, the mine operator shall be cited if a cab is feasible and has not been installed.

On equipment manufactured before the mid-1970s, acoustically treated cabs become increasingly infeasible due to the following factors: lack of availability of retro-fit cabs; difficulties installing cabs given the equipment's design; decreased acoustic effectiveness; and cost considerations given these concerns.

When it is determined that a cab is infeasible, engineering controls that are likely to be feasible include: (1) a windshield to block the engine noise from the employee; (2) an exhaust muffler along with redirecting the exhaust away from the employee; and (3) the placement of acoustic materials on the firewall and in the operator's compartment. Noise reduction of 5 to 10 dBA may be achievable by using these controls. The cost of the materials is approximately $2,000 per machine. A video tape demonstrating the installation of these controls is available for mine operators to review at their local MSHA office.

Acoustically treated cabs are available as an option on most new equipment and on a retro-fit basis for most equipment manufactured since the mid-1970s. Retro-fit cabs are available from various manufacturers at costs ranging from approximately $5,000 to $13,000. For comparison, the retail price of a mid-1970s D-9 Caterpillar[1] dozer in serviceable condition is approximately $70,000 to $80,000[2]. A cab installed at the factory when the unit is purchased may cost more than installing a retro-fit cab at a later date; however, the fit, durability and acoustic effectiveness of a factory installed cab is usually better. According to information received from Caterpillar, an acoustically treated air conditioned cab for a D-10N[3] dozer costs

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[1] Mention of any company or product names is for example only and does not imply Government endorsement of a specific firm or product.

[2] 1988 quoted cost.

[3] D-10N is the 1988 model designation for what was formerly Caterpillar's D-9L series.

$15,900[4], if ordered when the dozer is purchased. This represents 3.4 percent of the $470,617[5] cost of the D-10N. Noise levels inside a factory cab on a D10-N, during a standard work cycle, were reported by Caterpillar to be 88 dBA at the operator's position with the doors and windows closed.

Commonly encountered complaints with cabs are inadequate ventilation and temperature control. If ventilation is inadequate, employees operating such equipment have been known to open cab doors or break out windows to provide the needed ventilation, thereby significantly reducing the cab's acoustical effectiveness. This may result in a citation if MSHA should sample at that time and find the employee overexposed. Particular attention should therefore be given to selecting or designing a cab with an adequate pressurized air filtration/ ventilation system or air conditioning. In addition to maintaining the acoustical effectiveness of the cab, it may also result in increased worker comfort and productivity, as well as protecting the worker from excessive dust exposure.

Manufacturers are now offering more reliable and efficient air conditioners for mining equipment. Problems with their use can be avoided to a large extent by adhering to a good preventive maintenance program. Costs to install an air conditioner on units like a D-10N dozer could range from $2,500 to $4,500. Other measures could be taken to reduce the heat load in cabs, such as: putting shielding or insulation on the firewall, floorboard and cab roof; painting the outside of the cab roof with a reflective paint; and using tinted safety glass.

[4]1988 quoted cost.
[5]Ibid.

MSHA considers the following engineering noise controls to be feasible and effective in most circumstances to reduce the noise exposure of employees operating underground diesel powered haulage equipment (for example, LHDs, shuttle cars, haul trucks, etc.):

- exhaust mufflers and redirecting the exhaust away from the employee;
- use of barrier and absorptive material to reduce noise coming from the engine and transmission compartments; and
- acoustic material applied to the firewall between the employee and transmission compartment.

Total noise reduction of 3 to 5 dBA could be anticipated from the combined use of an exhaust muffler and acoustic materials, at a cost of less than $1,000 per machine. Although this reduction is significant, employee exposure may still exceed the PEL, requiring the continued wearing of adequate hearing protection.

MSHA testing has indicated that certain exhaust mufflers on underground diesel powered haulage equipment are particularly effective in reducing low frequency noise, whereas personal hearing protection is generally more effective in reducing high frequency levels. When an exhaust muffler is used along with personal hearing protection their combined attenuation can significantly reduce noise levels measured underneath the personal hearing protection. Results of MSHA in-mine testing have shown that levels measured underneath personal hearing protection, with no exhaust mufflers installed, exceeded 90 dBA in seven out of nine tests. The average level was 98 dBA. The use of an exhaust muffler reduced the average level to 87 dBA.

It should be emphasized that exhaust mufflers must be of proper design and construction to maximize noise reduction and minimize back pressure in the exhaust system. Some diesel powered haulage units are equipped with various devices to control exhaust emissions, such as: scrubbers, catalysts, filters and exhaust gas recirculation systems. These devices, though not as effective as mufflers, will provide some noise reduction. A muffler should not be added when such emission control devices are used because the combination may increase exhaust system back pressure beyond the unit's design specification. An exhaust muffler is also not recommended on diesel powered haulage units used in mines classified as gassy where their exhaust system must

meet the approval requirements in 30 CFR Part 36. In these cases the exhaust pipe can be directed away from the employee.

The effectiveness of acoustic materials in reducing noise levels beyond that obtained by the use of an exhaust muffler will vary depending upon the make and model of the unit, engine size, mechanical condition and mining conditions. Such treatments may include: the use of barrier and absorptive material to reduce the noise coming from the engine and transmission compartments; increased mass applied to the firewall; or sealing any openings between the employee and transmission. Particular care must be taken in the application of acoustic materials to avoid engine overheating. Materials selected should not absorb oil which could create a fire hazard.

In some underground mines, conditions permit using full-size surface haulage equipment. If environmental conditions are such that the use of an acoustically treated cab does not present a safety hazard due to impaired visibility, such cabs may be considered feasible on this equipment. Refer to the discussion of noise controls for "surface self-propelled equipment" for additional factors to be considered in determining the feasibility of cabs on such equipment.

Jumbo Drills

Noise levels on an untreated pneumatic jumbo drill can typically exceed 115 dBA at the operator's position. Hydraulic drills are usually about 5 to 10 dBA quieter.

Noise controls for pneumatic and hydraulic jumbo drills were discussed in a February 1, 1984, MSHA memorandum to district and subdistrict managers, which indicated that acoustically treated cabs and partial barriers were, in general, considered to be feasible controls for this equipment.

A well designed and constructed acoustically treated cab is more effective than a partial barrier and may reduce employee noise exposure to the PEL. Such cabs should be utilized instead of partial barriers wherever drill design and mining conditions permit. If an acoustically treated cab is not feasible, a partial barrier can yield significant noise reduction. However, because of the high noise levels produced by these drills, it is unlikely that a partial barrier will reduce employee exposure to the PEL, thereby requiring the continued use of personal hearing protection. Dual hearing protection (ear plugs under ear muffs) may be required if noise levels are particularly high and the attenuation of a single pair of hearing protectors is inadequate.

Commonly encountered complaints with cabs are inadequate ventilation and temperature control. In such instances, employees operating the equipment have been known to open cab doors or break out windows to provide the needed ventilation, thereby significantly reducing the cab's acoustical effectiveness. Particular attention should, therefore, be given to selecting or designing a cab with an adequate pressurized air filtration/ventilation system. Such systems may also increase worker comfort and productivity, as well as protecting the worker from excessive dust exposure.

Acoustically treated cabs may be available from the drill manufacturers or from suppliers of retro-fit cabs. Mine operators have also constructed retro-fit cabs of their own design, many of which were as effective as factory cabs and less costly.

Track Drills

Noise levels on an untreated track drill can typically exceed 115 dBA at the operator's position.

MSHA issued guidance on noise controls for pneumatic and hydraulic track drills in a June 30, 1986 memorandum to district and subdistrict managers. As indicated in that memorandum, the preferred noise control for such drills is an acoustically treated cab, provided that the drill design permits its installation. A well designed and constructed acoustically treated cab can reduce employee noise exposure to the PEL. On some very small pneumatic track drills it may not be feasible to install a cab. A cab may also be infeasible if the driller has to change steels frequently.

Acoustically treated cabs may be available from the drill manufacturers or suppliers of retro-fit cabs. Mine operators have also constructed retro-fit cabs of their own design, many of which were as effective as factory cabs and less costly.

Where a cab is infeasible, a partial barrier can usually be constructed and erected vertically along the length of the drill's mast. This barrier blocks the employee from noise coming from the drill and drill steel while standing at the operating controls. Such a barrier can be installed on almost any track drill and will not interfere with steel changing.

The partial barrier can be constructed at minimal cost out of angle iron and used conveyor belting. The barrier has achieved an average of 8 dBA noise reduction. However, noise levels at the drill operator's position are still likely to exceed 100 dBA with the barrier in place, requiring the continued use of adequate hearing protection. A video tape demonstrating the installation of a partial barrier is available for mine operators to review at their local MSHA office.

The use of an exhaust muffler or long exhaust hose directing the exhaust away from the drill, along with a cab or barrier, may provide additional noise reduction on pneumatic drills, particularly at times when the drill operator may be outside the cab or out from behind the barrier. Acoustically treating or isolating the drill's compressor may also be of some benefit if the noise from it contributes to an employee's overexposure.

If a cab is used, and it is determined that doors and windows must be kept closed to keep employee exposure within the PEL, then it may be necessary to provide an adequate pressurized air filtration/ventilation system or air conditioning. In addition to maintaining acoustical effectiveness, this may result in increased worker comfort and productivity, as well as protecting the worker from excessive dust exposure.

Hand-Held Percussive Drills

Noise levels on unmuffled pneumatically operated hand-held percussive drills can typically exceed 115 dBA.

In the late 1970s, exhaust mufflers began to be available for hand-held pneumatic drills (such as, jackleg drills, stopers and sinkers). Since that time, many drill manufacturers have offered either integrally muffled drills or retro-fit mufflers for their drills. In 1979, MSHA developed a muffler made from a section of rubber tire which was both economical and effective in reducing noise levels. Noise reduction with this muffler averages 6 dBA.

MSHA considers exhaust mufflers to be feasible controls for nearly all hand-held pneumatic drills used at both surface and underground mining operations. They are widely used throughout the mining industry. There may be a few drills where, due to their design and/or application, a muffler may not be feasible. If such a problem is encountered, it should be brought to the attention of Metal and Nonmetal's Division of Health.

A video tape and a T-Gram technical report (TD 1), which describe the design and installation of the rubber tire muffler, are available for mine operators to review at their local MSHA office.

Although exhaust mufflers are effective, it is likely that noise levels while drilling will exceed 105 dBA, requiring the continued use of hearing protection. At such high noise levels, it becomes increasingly important to evaluate the effectiveness of the hearing protection being worn. In some cases, dual hearing protection (ear plugs under ear muffs) may be needed to ensure adequate protection.

Draglines/Shovels

The most commonly used feasible control to reduce employee noise exposure on draglines and shovels involves the following:

- placement of a lead vinyl curtain or a solid barrier with a door behind the operator to shield the employee from engine noise;
- sealing holes that represent flanking paths for noise on the in-board side of the operator; and
- installation of acoustical absorption materials on all hard surfaces surrounding the operator which would not impede the operation of the equipment.

This method of control should cost less than $700 in materials and can yield 6 to 8 dBA reduction. A video tape demonstrating the installation of this control on a dragline is available for mine operators to review at their local MSHA office.

Portable Crushers

The most effective and frequently used noise control for employees operating a portable crusher is an acoustically treated control booth. Provided an employee's activities can be confined within the booth, a properly designed and constructed booth can reduce employee noise exposure to the PEL. If an employee's activities require leaving the booth, additional administrative or engineering controls may be needed to reduce the exposure when outside the booth. The effectiveness of an acoustically treated control booth is enhanced if it can be isolated from the crusher itself. A booth can be built on metal supports and connected to the crusher by a walkway. The booth and support structure can be made in such a manner that it can be easily transported to new mining sites. An MSHA T-Gram (TD 13) on the design of a mobile crusher booth is available at the local MSHA office.

If doors and windows are closed in the control booth to keep the employee's exposure within the PEL, then it may be necessary to provide an adequate pressurized air filtration/ventilation system or air conditioning. In addition to maintaining the acoustical effectiveness of the booth, this may result in increased worker comfort and productivity, as well as protecting the worker from excessive dust exposure.

Another alternative to reduce a crusher operator's noise exposure would be to move the employee to a quieter location where he can remotely control and view the operation. If the employee needs to stand near a conveyor belt to pick off oversize materials, a relatively inexpensive device can be constructed which will do this automatically or a partial barrier could be constructed to shelter the employee while performing this function.

Channel Burners

The channel burner is basically a jet burning tip, on a long handle, fueled by compressed air and diesel fuel. It produces an intensely hot flame that spalls the rock when directed against it. They are used in the dimension granite industry to cut granite blocks from the quarry. In a typical operation, the burner operator holds the handle and moves the burner back and forth, cutting a deep narrow channel in the granite.

Noise exposures of miners operating hand-held air burners are among the highest in the mining industry. Noise levels produced by these burners commonly exceed 120 dBA. A noise level of 105 dBA was measured under muff-type hearing protectors worn by a burner operator. Such high noise levels can rapidly damage one's hearing. Exposure to silica bearing dust and to hot chips of granite from this process also pose additional hazards.

Several types of equipment are currently used by the dimension granite industry as alternatives to using hand-held air burners. Among the most effective in reducing employee noise exposure is the diamond wire saw. The noise exposures of miners operating these saws are typically within permissible levels.

Beyond its lower noise levels, the diamond wire saw can cut 20 to 40 square feet per hour compared to an optimum of 8 to 12 square feet per hour with a hand-held air burner. Additionally, compared to other methods, the diamond wire saw produces no harmful levels of dust and cuts a smooth face with minimal loss of granite. The saw works best in areas of low pressure and low quartz content. High pressure in the granite deposit can pinch the wire, and high quartz content (harder granite) can reduce cutting speed and wire life. It is also effective for cutting areas of fractured rock which are difficult to cut with a channel burner. When using the wire saw, adequate guarding or barricading must be provided to protect employees from inadvertently contacting moving parts.

The diamond wire saw is commercially available from two manufacturers. The cost of the saw alone is approximately $50,000. The diamond wire costs approximately $85 per foot. Generally, 200 to 230 feet of diamond wire is needed for the average cut. Depending on the hardness of the granite and size of the cut, three to four cuts can be made before the wire needs to be replaced. Although the diamond wire saw can be used to

make most cuts in a quarry, it will not entirely eliminate the need to use a channel burner or drill.

Automated air burners are being used successfully at several granite quarries around the country. Miners operating these units can stand away from the burner, significantly reducing exposure to noise, dust, and hot chips of granite. It is also a faster and more economical method of cutting stone than a hand-held burner. Channel burners typically work best in harder granite. Although the use of the automated burner will result in significantly lower noise and dust exposures for the burner operator, other miners in the quarry may still be exposed to noise and dust generated from operating this unit.

The automated air burner is currently commercially available from only one supplier. However, at least one quarry operator is using one of his own design and construction. The cost of an automated burner is approximately $19,000, but it should pay for itself in under 2 years due to reduced operating costs. A video tape demonstrating the automated burner is available in each MSHA field office.

Hydraulic and pneumatic drills are also being used in lieu of hand-held air burners at several granite quarries. Slot drills, which use a guide bar to drill out the web left between holes, can be used to make an open channel. The initial cost of such a drill is higher than that of an automated burner or diamond wire saw. The cutting rate using a slot drill is approximately 19 to 21 square feet per hour. Noise levels experienced by operators of such drills, though high, are significantly less than those experienced by hand-held air burner operators. Additionally, it may be possible to add noise controls to such drills to further reduce miner noise exposure (see Page A-8: "Track Drills").

Oxygen-fueled hand-held burners were used in the past, but never became popular due to the high price of liquid oxygen. However, significant decreases in the cost of liquid oxygen may now make its use an attractive alternative. Due to the oxygen burner's lower operating pressure, it produces less dust and approximately 5 dBA less noise than a hand-held air burner, with noise levels averaging about 115 to 117 dBA. Reportedly its hotter flame results in faster cutting rates than with an air burner. One disadvantage is that, due to its lower operating pressure, a blow pipe may be needed to clear spalling from the channel.

Although the hand-held oxygen burner is less effective in reducing noise exposure than the other alternatives described in this appendix, it could be particularly promising if automated. One operator has developed and is using such a unit. Because rotation of the oxygen burner's tip is not needed, it should be easier to automate than an air burner and it may be possible for other mine operators to build their own units. Once the technology and equipment needed to construct an automated oxygen-fueled burner becomes readily available, MSHA will notify the industry and allow one year for mine operators using hand-held oxygen burners to automate their systems.

MSHA will continue to evaluate developing technology in this area. Currently, MSHA is evaluating the use of water jets to cut granite. One operator is successfully using such a device as his sole means of cutting granite.

Mine operators will be given until August 1, 1990, to evaluate the various alternatives to using hand-held air burners described in this policy. During this time period, MSHA will not cite mine operators when a miner's exposure exceeds the permissible level while operating a hand-held air burner, provided adequate hearing protection is worn. Due to the high noise exposure experienced by hand-held air burner operators, dual hearing protection (ear plugs under ear muffs) will be needed. After August 1, 1990, mine operators will be cited if MSHA finds a miner overexposed to noise while operating a hand-held air burner and MSHA determines that one of the described alternatives is feasible at that operation.

Mills

Frequently, mining personnel are exposed to noise levels of up to 114 dBA from milling operations. The following engineering noise controls may be feasible for such operations:

- resiliently backed liners;
- acoustically treated control booths;
- full or partial topless enclosures around mill equipment or employee work locations; and
- acoustic baffles suspended above enclosures.

In order to determine which control, or combination of controls, are feasible and effective to reduce the noise exposure of employees working in mills, it is usually necessary to do a time study to pinpoint the locations and noise sources contributing to the employee's overexposure. In some situations an acoustically treated control booth may be all that is needed, in others more extensive treatments may be necessary. Administrative controls may also be feasible to limit employee exposure to particularly noisy areas of a mill.

Control booths can be constructed and acoustically treated by mine operators or can be purchased from commercial sources.

Resiliently backed liners can be put on chutes, bins and other drop or impact points to reduce noise from these sources. Although such material is available from a number of commercial suppliers, often old conveyor belting can be used with comparable results.

In situations where numerous employees are exposed to the noise, full or partial topless enclosures around the mill may be feasible. Essentially, these enclosures create an acoustical shadow zone for the affected employees. The construction of such enclosures should incorporate the following considerations:

- be of sufficient height so as to create the desired acoustical shadow zone;
- be constructed of materials that meet MSHA's flammability guidelines;
- provide for adequate ventilation, if necessary, to avoid overheating of the milling equipment and temperature degradation of the acoustic material or the material being milled; and

- incorporate adequate maintenance accessibility and visual observation of the milling equipment where necessary.

Dependent upon the noise reduction required to lower an employee's exposure to the PEL, acoustical absorptive material may be needed within and/or above the enclosure. When treating the interior of a mill enclosure, materials such as faced fiberglass or mineral board should be considered. The utilization of acoustical baffles suspended above such enclosures has proven to be an effective method of reducing the overall noise levels. The amount of absorptive materials necessary can be mathematically calculated.

The cost for such enclosures is dependent on the type of materials utilized in its construction and the overall size of the enclosure. In three demonstrations of this technology, total material costs have ranged between $3500 and $7000.